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of Transportation

**National Highway
Traffic Safety
Administration**

UNIFORM PRE-HOSPITAL EMERGENCY MEDICAL SERVICES (EMS) DATA CONFERENCE

FINAL REPORT

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16. Abstract

This report contains an overview of the purpose, background, planning, conduct and results of a Federally sponsored conference held in Arlington, Virginia on August 16-18, 1993, to develop consensus on the identification and definition of uniform pre-hospital Emergency Medical Services (EMS) data elements. The final product of the conference is a set of eighty-one (81) uniform pre-hospital EMS data element definitions on which a conference consensus was achieved. These data element definitions together with consensus statements regarding various aspects of EMS data priorities, collection, and use are contained in Appendix F of the report. It was the conference consensus that collection of forty-nine (49) of these data elements was essential (E) and that collection of the remaining thirty-two (32) data elements was desirable (D) for development of statewide population based EMS data bases needed for pre-hospital EMS system evaluation. When linked with other pre-hospital data records, such as motor vehicle crash reports, EMS dispatch data, and with data bases of inpatient, emergency department, and ambulatory care, the linked data bases provide a means for outcome evaluation of EMS and for injury epidemiology and prevention program development.

Recipients of this report are encouraged to extract, duplicate, and circulate Appendix G and to promote use of these uniform data element definitions for documenting all pre-hospital EMS responses.

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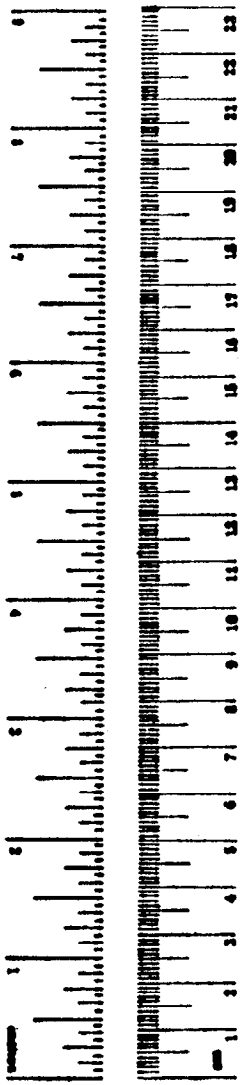
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F

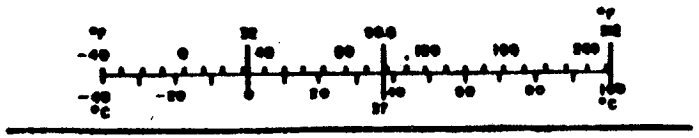


TABLE OF CONTENTS

APPENDICES

Executive Summary

This report contains an overview of the purpose, background, planning, conduct and results of a Federally sponsored conference held in Arlington, Virginia on August 16-18, 1993, to develop consensus on the identification and definition of uniform pre-hospital Emergency Medical Services (EMS) data elements.

The project was co-sponsored by the National Highway Traffic Safety Administration (NHTSA) and seven Agencies of the U.S. Department of Health and Human Services, and the Federal Emergency Management Agency, U.S. Fire Administration.

The final product of the conference is a set of eighty-one (81) uniform pre-hospital EMS data element definitions on which a conference consensus was achieved. These data element definitions together with a consensus statement regarding various aspects of EMS data priorities, collection, and use are contained in Appendix F of the report.

It was the conference consensus that collection of forty-nine (49) of these data elements was essential (E) and that collection of the remaining thirty-two (32) data elements was desirable (D) for development of statewide population based EMS data bases needed for pre-hospital EMS system evaluation. When linked with other pre-hospital records, such as motor vehicle crash reports, EMS dispatch data, and with data bases of inpatient, emergency department, and ambulatory care, the linked data bases provide a means for outcome evaluation of EMS and for injury epidemiology and prevention program development.

Appendix F of this report is formatted to promote extraction and use as a separate reference document and to encourage duplication, and circulation, so as to promote use of these uniform data element definitions for documenting all pre-hospital EMS responses.

Preface

The need for data for evaluating Emergency Medical Services (EMS) was first stated in the 1966 National Academy of Sciences report "*ACCIDENTAL DEATH AND DISABILITY: The Neglected Disease of Modern Society*". The report stated:

> "This information is vital on several scores. It is essential in recreating the circumstances of the accident and in relating the mechanisms of trauma to accident prevention. It is necessary for clinical analysis for improvement of therapy, and for appraisal of emergency facilities. Finally, it could provide a basis for determining the duration, nature and degree of disability and the long-term, natural history of specific injuries...."

Since 1966, this statement of need for EMS evaluation has been supported in guidelines in Federal statutes such as the:

- Highway Safety Act of 1966 (P.L. 89-564);
- Emergency Medical Services Systems Act of 1973 (P.L. 93-154);
- Trauma Care Systems Planning and Development Act of 1990 (P.L. 101-590); and others.

In spite of these Federal statutes and guidelines, provisions for EMS evaluation have not been widely implemented because of a variety of impediments including

- concerns about costs of collecting, computerizing and analyzing data; and

- lack of consensus on the definition of needed data.

Since 1980, NHTSA has been working on developing national consensus on two basic concepts to eliminate these impediments:

- First, that concerns about costs can be overcome through development of consensus that the value of the data collected exceeds its cost.

- Second, that public support of EMS system maintenance and improvement must be based on evaluation processes that are repeatable and comparable. For EMS System evaluation to be comparable, they must be based on uniform data element definitions.

NHTSA expects that the contents of this report will convince readers of the logic of these two concepts and thereby promote accountability for and improvement of EMS through documenting of pre-hospital EMS responses using the Uniform Pre-hospital EMS Data Element Definitions contained herein.

Foreward

NHTSA acknowledges and expresses its appreciation for the broad Federal interagency co-sponsorship and participation in this project by EMS associations, medical societies, state and local EMS administrators and a gratifying mix and number of EMS researchers and providers.

Any satisfaction from completion of this project will be short-lived, however, if it does not generate activities to advance the reporting, evaluation, and improvement of EMS systems. There are some promising signs that such activities are being generated and it is hoped that information about them will generate further initiatives by readers of this report.

Following are some developments that have taken place that we hope will be a harbinger of things to come:

- On April 11-12, 1994 NHTSA sponsored a meeting to initiate further deliberations on the definition of outcome measures for pre-hospital EMS. This effort is continuing.

- ASTM Task Group F30.03.03 has incorporated the Uniform Pre-hospital EMS Data Element Definitions resulting from this project into its draft *Standard Guide for Establishing and/or Operating Emergency Medical Services Management Information Systems*. In doing so, the ASTM Task Group considered many comments and suggestions submitted on data element definitions that were not received in time for incorporation in this report. ASTM F-30 consensus development of this draft guide is expected to be completed by November 1994.

- Several states have advised NHTSA of their intent to adopt the Uniform Pre-hospital EMS Data Element Definitions as they update their statewide EMS run report forms.

- NHTSA has initiated a new 5-year project to assist States in the development and evaluation of statewide population based highway injury data bases. In this connection the NHTSA EMS Division is initiating development of computer application software to facilitate pre-hospital EMS data collection, EMS record linkage, and EMS data base analysis using the uniform pre-hospital EMS data elements.

- Efforts are being made through the National Center for Health Statistics (Department of Health and Human Services) to harmonize pre-hospital EMS data element definitions with those used for computerized ambulatory care and hospital emergency department data bases.

Introduction

On August 16-18, 1993, the Department of Transportation, National Highway Traffic Safety Administration (DOT/NHTSA), along with eight other Federal agencies, co-sponsored the Uniform Pre-hospital EMS Data Conference in Arlington, Virginia. The purpose of the Consensus Development Conference (CDC) was to evaluate available information on the definitions of pre-hospital data elements and to produce consensus statements on those data element definitions that were recommended for uniform national use. The goals of the CDC were:

- To promote the development of a national consensus on a uniform set of EMS data elements and definitions; and
- To promote the consistent use of the data elements for EMS pre-hospital data collection for service reporting, management and evaluation.

To achieve the goals of the CDC, the following objectives were identified:

- To reach consensus on the identification and definition of "essential" and "desirable" elements obtained during pre-hospital EMS operations;
- To reach consensus regarding criteria for addition of data elements to a national pre-hospital EMS data element dictionary;
- To characterize obstacles to standardized definition, collection, recording, evaluation and dissemination of pre-hospital EMS data;
- To define ways in which standardized pre-hospital EMS data can be used to improve patient care and public health;
- To provide accurate and sufficient data regarding pre-hospital EMS operations to facilitate record linkage for process and outcome evaluation of emergency medical services; and
- To promote national consensus on the need for mandatory reporting of pre-hospital EMS operations, funding mechanisms and related issues.

The conference was structured to reach all segments of the health care profession, including emergency medical care providers and regulatory authorities that deal with emergency medical practices and procedures. Thus, included among the conference participants were physicians, nurses, emergency medical technicians, health care policy professionals and regulatory authorities.

The Consensus Development Conference Process

Sponsorship of the conference was initiated by NHTSA because of its experience with national studies of highway-related fatalities and injuries based on EMS data which were flawed due to the lack of uniformity in the definitions of EMS data elements collected in various states. For example, difficulties were encountered in the analysis and reporting of EMS data related to fatal accidents in NHTSA's Fatal Accident Reporting System. Similarly, problems were encountered in multi-state demonstration projects to determine the responsiveness of EMS to highway related injury crashes. Also, the lack of uniform data element definitions made it impossible to use pre-hospital computerized data sets from various states to deduce information needed to update the *DOT/NHTSA National Standard Curriculum for the EMT-Basic*.

In addition to these identified problems, the American Society of Testing Materials (ASTM) Task Group F30.03.03 had completed a draft national EMS voluntary consensus standard on *Planning and Operation of Emergency Medical Services Management Information Systems (EMS-MIS)* in 1992. The guideline had undergone several rounds of review, editing and consensus balloting, and was ready for final ASTM society-wide ballot and publication as a national EMS voluntary consensus standard. The ASTM Task Group delayed final balloting on this standard in anticipation of the outcome of this national conference. NHTSA also was aware that other organizations were interested in the development of a national consensus on the definitions of pre-hospital EMS data elements. Therefore, since the problems arising from the lack of uniform data element definitions also plagued several Federal programs related to emergency health care, NHTSA sought and received enthusiastic support for a national conference from eight other Federal agencies which agreed to co-sponsor the conference.

The approach for the CDC was based on *Guidelines for the Selection and Management of Consensus Development Conferences* developed by the National Institutes of Health, Office of Medical Applications of Research (NIH/OMAR). Using the NIH/OMAR Guidelines, NHTSA prepared and awarded a contract to provide technical, logistical and clerical support for the

Conference. The contract was awarded to Bright Associates, Inc. (BAI) of Alexandria, Virginia. Under the contract BAI assisted NHTSA and the other co-sponsoring Federal agencies to plan, conduct and document the Uniform Pre-hospital EMS Data Conference. The objective of the contract was to plan and conduct the conference, in accordance with the NIH/OMAR guidelines. Accordingly, the Conference was planned to use a broad-based representative panel of EMS program experts to listen to presentations by EMS data experts of information on data element definitions, to listen to discussions of the information by conference participants, to weigh the information, and then to develop consensus statements regarding the inclusion of the definitions in a set of EMS pre-hospital data elements recommended for uniform national use.

Conference Planning

Planning for the CDC was initiated in October 1992 by the Conference Plan Development Group (Table 1) representing NHTSA, ASTM and BAI. The Plan Development Group outlined agendas for a series of database review and coordination meetings that were held in January 1993. The Conference Plan Development Group developed the agendas for the Consensus Development Conference Planning Committee meeting, and the preliminary agenda for the Conference.

As NHTSA is interested in the input of all participating agencies and organizations, a series of inter-agency coordinating meetings were held to clarify the specific roles, responsibilities and tasks of Federal, state, regional and local agencies represented in the development of the uniform pre-hospital EMS data elements. The purposes of these inter-agency coordinating meetings were to discuss topics to be presented and papers to be written for the Consensus Conference, and to coordinate the plans for the Conference logistics. The participants in these meetings were encouraged to emphasize "consensus" in the development of the data elements.

The intent of the Coordination Workshop was to include and involve major stakeholders in discussions of issues related to coordinating the databases of groups that have developed alternative ambulance run reports. Participants in the Coordination Workshop, (Table 2) represented those agencies and organizations that have an important interest in the development of uniform data elements and definitions for EMS professionals.

As one of the initial tasks, NHTSA solicited participation in the planning of the conference. A Conference Planning

Committee was organized, consisting of representatives from the eight co-sponsoring Federal agencies, and of representatives from fourteen supportive national EMS organizations that were considered to have significant interest in the development of uniform pre-hospital EMS data element definitions (Table 3). At the outset of the contract, Kevin K. McGinnis and Ronald Stewart, M.D. were selected by NHTSA for the key roles of Conference Chairman and Conference Panel Chairman respectively, which enabled their participation on the Conference Planning Committee, as recommended in the NIH/OMAR guidelines. Unfortunately, Dr. Stewart was unable to attend the conference, and NHTSA selected J. Michael Dean, M.D. to replace him as Conference Panel Chairman.

The Conference Planning Committee reviewed and approved NHTSA's plan for the composition of the Conference Panel and the plan for designation of the panel members. The Committee also reviewed the roles, and ratified the selection of the Conference Panel Chairman to lead and moderate the work of the Conference Panel, and of the Conference Chairman to manage and moderate the overall proceedings of the conference. The Committee agreed that the Conference Panel would be selected to represent the broad range of data uses and users, and recommended that NHTSA establish a seven-member Data Element Task Group. This Task Group (Table 4) would review pre-hospital EMS data element definitions from various sources, and assemble the definitions into a uniform format for consideration at the conference. In addition, the committee reviewed and approved topics for two conference papers: an opening theme paper (Appendix B) and a closing paper (Appendix G).

The Data Element Task Group was charged with the responsibility to prepare a background paper on the content of the data element document. The paper addressed the data elements and their definitions, and included a matrix, an excutive summary of outliers, and a dictionary of all potential definitions. The Task Group reviewed the justifications provided for all of the data elements. Based on their review, the Task Group identified five terms and their definitions that would be used as the justification for all of the data elements. It is important to note here that "Research" was not included as a justification for data elements on the basis that no data elements would be justified solely for research purposes. The five terms that were identified were:

- Medical Record - Data elements used to document the care that was provided for a patient and for

medico/legal purposes. However, medical record can not be used to justify desirable elements.

- Epidemiological - Data elements used in the evaluation of pre-hospital care, and in the identification of environmental and demographic factors impacting populations.

- Operations - Data elements used for administration of services and utilization of resources.

- Financial - Data elements necessary for billing for services.

- System Evaluation/Quality Improvement - Data elements used to support ongoing monitoring and the improvement of the delivery of care, including the potential of linking various data sets.

A data element matrix or "strawman" was compiled, using data from all of the states that are using a statewide standard, and from the standards used by the U.S. Department of Health and Human Services, ASTM, and those currently under development by the National Association of State Emergency Medical Services Directors. The purpose of the Consensus Development Conference was to develop a set of national voluntary consensus standards.

All 50 states had an opportunity to address issues related to the data element matrix. States that were represented in the matrix were given an opportunity to review the matrix and make changes prior to the Conference. The final form of the matrix was as inclusive as possible, and a summary report provided information about the percentage of states reporting that they collect data on each of the data elements.

Conduct of the Conference

The following principles and procedures were established which governed both the planning for and the conduct of the Consensus Development Conference:

1. The CDC was designed to provide for interaction between expert presenters of proposed uniform data element definitions, participants and the independent broad-based Conference Panel. The Conference Chairman was responsible for moderating this interaction in accordance with the conference plan. The Conference Panel was assembled to give balanced, objective and knowledgeable attention to the topic. The Conference Panel met in public session for the presentation of all

information by experts, and for commentary and discussion by conference participants; and in executive session when preparing consensus statements. Table 5 provides a listing of the panel members and the interests they represented.

2. The opening plenary session of the conference was designed to serve two purposes. First, it was to provide the conference participants with the backdrop and rationale against which the CDC was originally conceived, including an overview of management information systems in EMS (conference paper by Dr. Shuman in Appendix B). The second purpose was to provide the participants with an overview of the draft data element document that was prepared by the Data Element Task Group, including a discussion of the key issues involved in pre-hospital data collection and the consensus process that were addressed by the Task Group (conference paper by Dr. Spaite in Appendix C).

3. Detailed descriptions for each data element workshop were provided in advance with conference registration materials. To facilitate detailed discussions of the large number of data elements, and to maximize input from the participants, Conference Panel members were distributed among five workshop panels of two to three members each. The members of the Data Element Task Group served as the presenters of all information on five groups of data element definitions. Each workshop, ranging in size from 15 to 50 participants, was moderated by a facilitator who was neither a member of the Conference Panel nor of the Data Element Task Group. The conference included three workshop sessions, with the results of these sessions made available at each of the successive workshops. The panelists, the facilitator and the Task Group members remained with the same workshop session throughout the entire conference.

4. Data elements discussed in the workshops were taken from a set of proposed data element definitions prepared by the Data Element Task Group for consideration at the conference. These had been assembled into a workbook and distributed, in advance of the conference, to all registered conference participants. The participants were invited to introduce new data elements for consideration by submitting them in writing in the prescribed data element definition format to the facilitator of the appropriate workshop. The facilitators reproduced and distributed the new data element definitions to the workshop participants at the beginning of the workshops, and these were presented by the originator for discussion after other scheduled data elements had been considered.

5. A responsibility of the Conference Panel was to develop responses to a number of specific issues that served to determine the scope and direction of the conference. The issues were developed and circulated to participants in advance of the conference. Additional issues were raised by the participants in the course of the workshops.

6. Workshop facilitators moderated discussion and commentary on the data element definitions by the workshop participants. When the workshop panel determined that there had been sufficient discussion to resolve uncertainties regarding a given definition or issue, discussion was closed and the panel proceeded to the next data element presentation.

7. Based on the workshop presentations, discussions and commentary, the workshop panel members synthesized the recommended wording for data elements and their definitions, and recommended comments that should accompany each data element definition.

8. Following the workshops, the Conference Panel met in executive session to complete, compare and combine the workshop panel findings, to develop a draft conference consensus statement for inclusion in the final report, and to list those data element definitions on which consensus was reached and the uncertainties regarding those on which consensus was not reached.

9. At the close of the conference, the draft conference consensus statement was presented to the participants in a plenary session. Following public discussion and revision by the Conference Panel, the statement was adopted formally and became a record of the conference.

The names, short definitions and priority ("E" for essential, and "D" for desirable) of recommended uniform pre-hospital EMS data elements are presented in Table 6. Other data elements considered, but not recommended by the Panel, are listed in Table 7.

The Consensus Development Conference Results

The primary product of the conference is the Conference Panel Consensus Statement and a set of Uniform Pre-Hospital EMS Data Element Definitions on which consensus was achieved (Appendix F). The Consensus Statement, based on publicly available data and information, is not intended to be a primary source of data or information as one might find in a technical report, but rather to reflect the consensus view of the Panel members.

The creative work of the Conference Panel was to synthesize the information, along with sometimes conflicting points of view,

into a clear statement of the data element name, definition and necessary explanatory comments for inclusion in a set of uniform pre-hospital data element definitions. When consensus could not be achieved, the Panel reflected this by noting uncertainties, options, or minority viewpoints. In addition to consensus statements on each recommended data element, the Panel also synthesized consensus statements, on particular and cross-cutting issues that were discussed by conference participants, regarding uniform pre-hospital EMS data elements and their use.

Conference Panel Consensus Statement Highlights

While the full text of the Conference Panel Consensus Statement speaks for itself, the following are some of the highlights from that document.

Improving Data Systems in EMS

The Panel recommended that all data systems related to EMS address several issues which have been inadequately considered in the past. By devoting proper attention to these issues, the quality of data which are obtained from pre-hospital personnel will improve, and satisfaction with the data collection process will increase.

Feedback to Data Sources

It is imperative that any agency, regional, state or national entity that collects data from providers must provide feedback to the source of the data. Such feedback should include constructive information about the quality of data submission, but more importantly, reports should be provided that will convey useful information about system performance. For example, an ambulance agency should receive statistical and descriptive information about their transported patients, the region's comparable statistics, the statewide statistics, and national statistics. Feedback must not be restricted to "rejected" data sheets, but must include reports which are genuinely useful to EMS personnel who provide the data.

When data are utilized for research or epidemiological purposes, whether by university-based academic researchers or state health department injury programs, it is imperative that feedback about such research be provided to the EMS personnel and agencies who provide the data that are used. It will be of high interest to EMS personnel and agencies to know about useful results of their data collection efforts, which represent large personal and economic investments.

There must be a single point of contact to receive comments and feedback about the uniform EMS data set that is defined in this

consensus statement. The purpose is to receive comments, both positive and negative, about the data set as it is implemented over the next several years. Comments could include interesting reporting formats, critical review of existing data elements, and suggestions about additional data elements. In the future, the uniform EMS data set should be revised in accordance with the comments received, using a consensus process similar to that used in this conference.

Sources of Data

The Panel deleted the identification of data sources from the data element definitions. It was the belief of the panel members that such identification is meaningless, as the sources of specific data elements are highly variable between agencies and provider groups. However, it is recognized that the pre-hospital provider is the source of most data elements. For that reason, the ability of a pre-hospital provider to collect data within the same time frame as the provider cares for an emergency patient must be considered when evaluating individual data elements.

Data Element Priority Definitions

The data elements that have been listed in this consensus statement represent information components that are important in the ongoing evaluation of EMS systems. All of the data elements that appear in this consensus statement are valuable from a variety of perspectives. Data elements that have been removed from the consensus statement may also be of great value to specific individuals, but were not considered of broad enough importance to be included.

Data elements may be used in several ways. For example, data elements may be of critical importance to the clinical care of the patient, and those data elements may be an integral part of the patient care record. Examples of this type of data element include medications administered, along with dosage and route of administration. Other data elements may be of crucial importance for evaluation of the EMS system, such as times of dispatch and patient outcome. Some data elements are useful for specific types of research, or for answering specific epidemiological questions. For example, certain data elements are useful to answer specific questions about out-of-hospital cardiac arrest. Finally, some data elements are fundamental data items that are not only crucial for local operations, but also are useful to serve broad regional and national purposes. For example, knowledge of the birth dates of all EMS patients for a year would provide national, statewide and regional information about the numbers of pediatric patients involved in EMS responses. Such information could guide the construction of pre-hospital curriculum materials.

The Panel categorized each data element as "essential" or "desirable." An essential data element is crucial for the basic operations of an EMS service, and can serve a purpose at regional or national levels. Other elements, categorized as desirable, may be critical to local operations, but may not be considered critical in all jurisdictions or situations. For example, on the one hand, it is crucial that EMS providers collect information for billing purposes, or their sources of funding will be jeopardized. However, on the other hand, while it is crucial to mark certain items on a pre-hospital patient care record for clinical purposes, the detailed information on this level may not be useful on a broader basis.

The proposed uniform data set consists of 81 data elements, of which 49 have been characterized as essential. As the Panel marked data elements as either essential or desirable, they recognized that a uniform EMS data set is evolutionary. Many data items have been categorized as desirable because the Panel recognized the need to phase-in certain data elements on a feasible timetable. Thus, the Panel envisioned that the data set will be re-evaluated within several years for reconsideration of definitions and priorities because other data elements may become useful on a regional or national level. In addition, other data elements, currently prioritized as essential, may fail to demonstrate value at a regional or national level, and subsequently may be either reclassified as desirable or deleted.

Beyond the data elements that are marked as essential, it is important for states, regions and individual provider agencies to review all of the data elements contained in this consensus statement, and to evaluate the usefulness of the desirable data elements. It also is important that additional data elements be considered for use, based on the importance of such data elements to the local providers. This consensus statement is in no way meant to either constrain or restrict the choices for inclusion of data elements in a provider database system. Rather, the consensus statement is intended to provide nationally uniform definitions for a set of data elements that are considered essential and desirable for documenting each EMS response. The Panel also noted that many types of data are best collected by EMS responders because these providers witness events and have access to information not directly available to later health care providers, such as those in the hospital setting.

Scope of the EMS Data Set

The Panel restricted its focus to information relating to events beyond the dispatch process, but prior to the emergency department care of the patient. Information related to dispatch, including dispatch codes, may be of great importance to pre-hospital agencies. However, the proposed data set does not

include data elements in this category. For the same reason, data items which are collected in the emergency department or later phases of medical care are not included in the proposed data set.

The Panel emphasized that no efforts have been made to construct a model ambulance run record or trip report. The data elements which are required for a properly documented ambulance run, fire department response or other EMS patient care record include many elements which are not contained in the proposed data set.

Outcome Information

Numerous data elements were proposed in order to derive outcome information about EMS responses. The Panel considered outcome information to be of critical importance. However, the Panel concluded that meaningful outcome information would require linkage to emergency department and other medical record files. Therefore, outcome variables have not been included in the proposed data set. The Panel emphasized, however, that this approach is not intended to limit efforts to derive meaningful outcome information about EMS. Agencies which collect EMS data are encouraged to explore various types of data elements which are related to this important issue. At the present time, the Panel did not recommend any specific data elements in this category.

Times and Time-lines

There is considerable difficulty with the generic issues of how to handle pre-hospital times and the time-line which represents the continuum of care rendered to a patient in the pre-hospital setting. However, there was broad interest from the conference participants in several such issues.

First, the format for time data elements was debated at length. Many agencies and regions are interested in accurate, synchronized time information, including hours, minutes and seconds. Other agencies do not have the technology to permit accurate assessment of times. The reality for pre-hospital providers in the field often is a personal watch, without synchronization to a standard time. Thus, there was considerable debate and discussion about including any time elements. The Panel encouraged the use of automated recording of time information, generally via dispatch and communication centers. Such automatic recording will improve accuracy of timing information which will permit detailed assessment of system performance.

Second, many participants believed that time should be defined in relative terms from arrival or dispatch time, or analyzed in

intervals. Again, the ability of agencies to measure time in absolute, relative or interval terms is variable. The Panel agreed that any desired analysis can be constructed from absolute times. Therefore, they chose absolute times in military format, using a four character numeric code representing 0 to 24 hours (H) and 0 to 60 minutes (HHMM), as provided in Federal Information Processing Standards.

Finally, many of the events that occur during an EMS event are important to sequence on a time-line. For example, it is important to define which procedures or medications were administered and when they were administered. The Panel commended agencies that attempt to collect such information for computer storage and retrieval, but also recognized the large technical obstacles that currently exist for such data collection. Therefore, very few timing elements that are associated with procedures, medications or other events were marked as essential.

Linkage Issues

It is imperative that the uniform pre-hospital EMS data set be viewed in the context of linkage to crash reports, emergency department records and inpatient discharge data. The Panel considered several issues to be of importance. First, it is crucial that emergency departments, hospitals, rehabilitation facilities and other health care providers understand the importance of providing data to EMS system administrators. Meaningful outcomes are difficult or impossible to define within the time-frame of the pre-hospital EMS response, but those outcomes are extremely important to the pre-hospital provider.

Second, the data set includes a variety of elements that can play a powerful role in probabilistic linkage of record files. These include names, birth dates, gender and location information. Using such identifiers, it is possible to automatically link data files that do not have explicit linking record numbers at high efficiency. Probabilistic software has been provided to all states by the National Association of Governors' Highway Safety Representatives (NAGHSR) for linking crash and EMS files. This technology is not futuristic, and data linkage is practical even without common record numbering systems.

Finally, common record numbering systems greatly enhance the ability to simply link data files. Hence, the data set includes record numbers of a variety of types. Such numbers can be used by probabilistic linkage software in a manner similar to demographic identifiers.

Conclusions

The culmination of this consensus development conference and process was the enthusiastic realization by the participants that important first steps have now been taken to advance the field of EMS evaluation. However, a lingering concern of the conference participants is the question of where we go from here given the need for more uniform reporting of pre-hospital EMS responses as a means of improving accountability and continued financial support of EMS systems. The paper by Sandra W. Johnson (Appendix G) provides an important analysis of future steps. In addition to other impacts related to proposed national health care reform, it appears that the reporting of pre-hospital responses may become a precondition for reimbursement. For these and other reasons, conference participants were unanimous in their support for early dissemination and adoption of these nationally-uniform pre-hospital EMS data element definitions.

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TABLE 6
ESSENTIAL AND DESIRABLE UNIFORM PRE-HOSPITAL EMS DATA ELEMENTS

No.	Name	Definition	Pri-ority
1	Incident Address	Address where patient was found, or address to which unit responded	E
2	Incident City	City or township where patient was found	E
3	Incident County	County or parish where patient was found	E
4	Incident State	State, territory, Province or District where patient found	E
5	Location Type	Type of location of incident	E
6	Onset Date	Date of onset of symptoms or injury date	D
7	Onset Time	Time of onset of symptoms or injury time	D
8	Date Incident Reported	Date the call is first received by PSAP or other designated entity	E
9	Time Incident Reported	Time call is first received by PSAP or other designated entity	E
10	Time Dispatch Notified	Time of first connection with EMS dispatch	E
11	Date Unit Notified	Date response unit is notified by EMS dispatch	D
12	Time Unit Notified	Time response unit is notified by EMS dispatch	E
13	Time Unit Responding	Time response unit begins physical motion	E
14	Time Arrival at Scene	Time EMS unit stops physical motion at scene (last place unit or vehicle stops prior to assessing patient)	E
15	Time Arrival at Patient	Time response personnel establish first direct contact with patient	D
16	Time Unit Left Scene	Time response unit began physical motion from scene	E
17	Time Arrival at Destination	Time when patient arrives at destination or transfer point	E
18	Time Back in Service	Time response unit back in service available for response	E
19	Lights and Sirens To Scene	The use of lights and sirens to scene	E
20	Service Type	Type of service requested	E
21	Incident Number	Unique number for each incident reported to dispatch	E

Note: E and D indicate data element priority is "essential" or "desirable"

TABLE 6 (Continued)

No.	Name	Definition	Priority
22	Response Number	Unique number for each individual response by a response unit to an incident	E
23	Patient Care Record Number	Unique number for each patient care record (PCR)	E
24	Agency/Unit Number	Number that identifies the agency and unit responding to an incident	E
25	Vehicle Type	Type of vehicle which responded to incident	E
26	Crew Member One Number	Personnel certification/license number for first crew member	E
27	Crew Member Two Number	Personnel certification/license number for second crew member	E
28	Crew Member Three Number	Personnel certification/license number for third crew member	D
29	Crew Member One Type	Personnel certification/license level of crew member	E
30	Crew Member Two Type	Personnel certification/license level of crew member	E
31	Crew Member Three Type	Personnel certification/license level of crew member	D
32	Patient Name	Patient name	E
33	Patient Street Address	Patient's street address	D
34	City of Residence	Patient city or township of residence	D
35	County of Residence	Patient county or parish where patient resides	D
36	State of Residence	State, territory, province, or District of Columbia, where patient resides	D
37	Zip Code of Residence	Zip code of patient's residence	E
38	Telephone Number	Patient's primary telephone number	D
39	Social Security Number	Patient's Social Security number	D
40	Date of Birth	Patient's date of birth	E
41	Age	Patient's age or best approximation	D
42	Gender	Gender of patient	E
43	Race/Ethnicity	Patient's racial and ethnic origin	E

TABLE 6 (Continued)

No.	Name	Definition	Priority
44	Destination/ Transferred to	Health care facility or pre-hospital unit/home that received patient from EMS responder providing this record	E
45	Destination Determination	Reason a transport destination was selected	E
46	Lights and/or Sirens Used from Scene	Use of lights and/or sirens from the scene	E
47	Incident/Patient Disposition	End result of EMS response	E
48	Chief Complaint	Statement of problem by patient or other person	D
49	Cause of Injury	External cause of injury	E
50	Provider Impression	Provider's clinical impression which led to the management given to the patient	E
51	Pre-existing Condition	Pre-existing medical conditions known to the provider	E
52	Signs and Symptoms Present	Signs and symptoms reported to or observed by provider	E
53	Injury Description	Clinical description of injury type and body site	E
54	Injury Intent	Intent of individual inflicting injury	D
55	Safety Equipment	Safety equipment in use by patient at time of injury	E
56	Factors Affecting EMS Delivery	Special circumstances affecting the EMS response or delivery of care	D
57	Alcohol/Drug Use	Suspected alcohol or drug use by patient	E
58	Time of First CPR	Best estimate of time of first CPR	D
59	Provider of First CPR	Person who performed first CPR on patient	D
60	Time CPR Discontinued	Time at which medical control or responding unit terminated resuscitation efforts in the field	D
61	Time of Witnessed Cardiac Arrest	Time of witnessed cardiac arrest	D
62	Witness of Cardiac Arrest	Person who witnessed cardiac arrest	D

TABLE 6 (Continued)

No.	Name	Definition	Pri-ority
63	Time of First Defibrillatory Shock	Time of first defibrillatory shock	D
64	Return of Spontaneous Circulation	Whether a palpable pulse of blood pressure was restored following cardiac arrest and resuscitation in the field	D
65	Pulse Rate	Patients palpated or auscultated pulse rate expressed in n/min	E
66	Initial Cardiac Rhythm	Initial monitored cardiac rhythm as interpreted by EMS personnel	D
67	Rhythm at Destination	Monitored cardiac rhythm upon arrival at destination	D
68	Respiratory Rate	Unassisted patient respiratory rate expressed in n/min	E
69	Respiratory Effort	Patient's respiratory effort expressed in phases 0-3	D*
70	Systolic Blood Pressure	Patient's systolic blood pressure	E
71	Diastolic Blood Pressure	Patient's diastolic blood pressure	D
72	Skin Perfusion	Patient skin perfusion expressed as normal or decreased	D*
73	Glascow Eye Opening Component	Patient's eye opening component of the Glascow coma scale	E
74	Glascow Verbal Component	Patient's verbal component of the Glascow coma scale	E
75	Glascow Motor Component	Patient's motor component of the Glascow coma scale	E
76	Glascow Coma Score (Total)	Patient's total Glascow coma scale score	D
77	Revised Trauma Score	Patient's revised trauma score	D
78	Procedure or Treatment Name	Identification of procedure attempted or performed on patient	E
79	Procedure Attempts	Total number of attempts for each procedure attempted, regardless of success	D
80	Medication Name	Medication name	E
81	Treatment Authorization	Indicates the type, if any, of treatment authorization	D

*** essential for children**

TABLE 7
OTHER DATA ELEMENTS CONSIDERED

Name	Definition
Latitude/Longitude	Latitude and longitude of incident
Reason For Dispatch	Type of event based on the dispatcher's assessment, that resulted in the EMS response
Time First Intervention Begins	Time EMS unit personnel provides first medical intervention
Time Patient Moved	Time patient physically moved towards transport unit
Time Transfer To Facility Care	Time patient care assumed by facility
Investigation Number	Law enforcement investigation number
Prior EMS Care	Highest level of prior EMS care by on-duty certified/licensed personnel
Unit Type	Type of service unit authorized to provide care
Insurer Payee	Agency or individual responsible for paying EMS service delivered
Facility Bypass	Primary reason for closest receiving facility bypass
Incident/Patient Disposition	End result of response/treatment
Type Of Call	Type of event, based on the EMS assessment, that resulted in the EMS response
Dispatch Presumptive Problem	Patient problem as identified by dispatcher
Illness Clinical Description - Primary	Clinical description of illness type
Illness Clinical Description - Secondary	Clinical description of illness type
Trauma Triage Criteria	Lists all applicable indications for trauma triage to specialized care facility, regardless of actual destination
Occupant Space Intrusion	Mechanism by which passenger space was intruded
Work Relatedness	On the job occurrence during routine employment activity
Found Medic Alert ID	Indicated as (yes) if medic alert bracelet or necklace is located on patient; (no) otherwise
ABC Assessment	Initial patient assessment items
Time Of Initial Vitals	Time initial patient vital signs recorded
Temperature	Patient's initial temperature

TABLE 7 (Continued)

Name	Definition
Level Of Consciousness - Initial	Patient's initial level of consciousness (AVPU)
Initial Pulse Oximetry Reading	Patient's initial pulse oximetry as measured by ons
Rhythm After Pre-hospital Defibrillation	Cardiac rhythm after last defibrillation by EMS
Procedure Time	Time successful procedure began
Procedure Success	Identification of whether or not each procedure was completed successfully
Procedure: Personnel Identifiers	Identification of personnel performing each procedure
Procedure: Scent/Transport	Indicates whether each procedure was performed on scene or during transport
Medication Time	Time that medication was administered
Medication Route	The route or method used for administration of medication
Medication Response	Patient response to medication given
Medication Personnel Identifier	Personnel identification number of person who administered medication
Treatment Protocol/Standards	Each BLS/ALS treatment standard with a unique data file
Medical Direction Facility Identifier	Identifies the facility providing on-line medical direction
Patient Arrival Condition	Medical status of patient at the time of delivery to treatment facility or other EMS unit
Change in Condition	Change in patient condition after the EMS service turns the patient over to the receiving facility or the call terminates
Cost For Service Delivery	Actual costs to provide services

TABLE 8

Sponsored By:

National Highway Traffic Safety Administration
U.S. Department of Transportation

Cosponsoring Organizations

Division of Trauma and Emergency Medicine,
Health Resources and Services Administration

Maternal, Infant, Child, and Adolescent Health Bureau,
Health Resources and Services Administration

National Center for Injury Prevention and Control,
Centers for Disease Control and Prevention

Office of Coverage and Eligibility Policy,
Health Care Finance Administration

Office of Rural Health Policy,
Health Resources and Services Administration

Office of Science and Data Development,
Administration for Health Care Policy and Research

APPENDIX A

CONFERENCE AGENDA

UNIFORM PRE-HOSPITAL EMS DATA CONFERENCE

August 16-18, 1993
Conference Agenda

Sunday, August 15, 1993

4:00 p.m. - 6:00 p.m.	REGISTRATION CHECK-IN Grand Ballroom Lobby Conference Material Distribution

Monday, August 16, 1993

8:00 a.m. - 9:00 a.m.	CONTINENTAL BREAKFAST Grand Ballroom Foyer
9:00 a.m. - 12 noon	OPENING PLENARY SESSION Grand Ballroom: Salons I & II **Welcome** Susan D. Ryan Chief, Emergency Medical Services Division National Highway Traffic Safety Administration, DOT **Conference Overview** Kevin McGinnis Conference Chairman **Topic:** *Emergency Medical Services-* *Management Information System* Larry Shuman, Ph.D. Interim Dean, School of Engineering University of Pittsburgh

Tuesday, August 17, 1993

8:00 a.m. - 8:30 a.m.	CONTINENTAL BREAKFAST Grand Ballroom Foyer
8:30 a.m. - 12:00 p.m.	WORKSHOP SESSION II
	Task Group 1: Response Data Elements Grand Ballroom: Salon I
	Task Group 2: Patient/Provider Identifiers and Disposition Data Elements Grand Ballroom: Salon II
	Task Group 3: Clinical Data Elements Plaza Ballroom A
	Task Group 4: Clinical Data Elements Plaza Ballroom B
	Task Group 5: Clinical Data Elements Grand Ballroom: Salon III
10:30 a.m. - 10:45 a.m.	COFFEE BREAK Grand Ballroom Lobby
12:00 p.m. - 1:30 p.m.	LUNCHEON The Dining Room
1:30 p.m. - 5:00 p.m.	WORKSHOP SESSION III
	Task Group 1: Response Data Elements Grand Ballroom: Salon I
	Task Group 2: Patient/Provider Identifiers and Disposition Data Elements Grand Ballroom: Salon II

APPENDIX B

PLENARY SESSION PAPER

EMERGENCY MEDICAL SERVICES - MANAGEMENT INFORMATION SYSTEMS

EMERGENCY MEDICAL SERVICES - MANAGEMENT INFORMATION SYSTEMS

Larry J. Shuman, Ph.D.
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Keynote address delivered at the Uniform Pre-hospital EMS Data Element Concensus Development Conference, August 16, 1993.

Healthcare organizations are operating in a dynamic, competitive environment in which changing priorities are creating information requirements that mandate both improved information systems, including data storage and analysis capabilities, and better ways to integrate existing systems. The healthcare information systems of the 1990s must be able to combine data from different sources in a timely manner in order to address problems in patient care, evaluation, cost management, strategic planning and marketing. This is equally true for pre-hospital and hospital information systems, both of which are marked by a lack of standards and commonality of purpose.

According to Bognanni and Epstein (1992):

> *The increased demand for information on the use, cost and quality of healthcare services reflects a growing interest in attempts to better understand the healthcare system and its component parts.... (However), we live in an information-oriented society and are subjected to information overload. A fundamental problem is that "We are drowning in information and thirsting for knowledge." To alleviate this situation, there is need to ensure timely access to comparable, uniform, accurate, up-to-date information. This is a prerequisite for acquiring knowledge.*

The focus of this *Uniform Pre-Hospital EMS Data Conference* is on achieving consensus as to those elements and their definitions which would comprise a uniform, pre-hospital care data set. Indeed, the primary reason for convening here is to achieve a broad consensus on emergency medical services management information systems (EMS MIS) guidelines. The successful outcome of this conference should enable ASTM Committee F-30 to hold final balloting on its draft Guide for *Establishing and/or Operating Emergency Medical Services Management Information Systems* (Robinson, 1992). (See appendix for a definition of management information systems.)

However, before specifically addressing pre-hospital care information systems, some comments about hospital information systems are appropriate. This is not only because of an approximately 30 year history of implementing information systems

in the hospital environment, but to be most valuable, pre-hospital care information systems must be linked to hospital systems. Having spent two decades in planning, monitoring and evaluating emergency care systems, we have concluded that obtaining reliable, complete patient information is imperative for future achievements. This will not occur until pre-hospital data is linked to emergency department data which is then linked to inpatient information.

Setting the Stage - Healthcare Information Systems

Hospital information systems have evolved in response to both technological and societal changes, starting with the enactment of Medicare and Medicaid in the mid-1960s. These two Federal initiatives first motivated health care organizations to introduce the emerging computer technology, primarily automated financial systems (i.e., billing, payroll, accounts payable and general ledger) (Lemon and Crudele, 1987). Until the mid-1970s, few organizations applied data processing technology to anything other than the increasingly more comprehensive financial systems. However, by the late 1970s, information processing support expanded into other areas, particularly patient care, due, in part, to a growing number of "niche" vendors who sold only one type of application. Thus the proliferation began of computer systems which, by design, were not intended to be interfaced.

With limited alternatives available, suboptimization resulted. Each hospital department was forced to concentrate on meeting its own computing needs with little regard for the system's ability to communicate with other systems. The proliferation of these independent systems increased in the late 1970s and early 1980s. However, at the same time that Medicare, Medicaid and the other third party payers were becoming extremely cost conscious, hospitals were realizing diminishing returns on information systems due to their high maintenance costs, multitude of vendors, and increased data redundancy. An analogous situation was emerging at the pre-hospital level where these same types of factors were leading providers to question the relative value of computerization for more than billing.

Also in the mid-1970s, a number of computer service companies developed and marketed integrated systems that used a single, large database for storing the hospital's data. The prototype for these systems was the model development and implementation of a comprehensive hospital information system at El Camino Hospital in 1972 and funded in part by the then Department of Health, Education and Welfare and the Lockheed Corporation (Carter, 1989).

After much experimentation and cost, an emerging consensus questioned whether this approach would work satisfactorily

(Morris and Brandon, 1988; Martin, 1990; Hume, 1989). Many hospitals and vendors then turned to distributed systems; i.e., separate systems which could be "distributed" to user departments throughout the institution. Early attempts at distribution also proved to be more costly and less reliable than anticipated, primarily due to technology that was as inadequate for supporting distributed systems as it was of supporting the large comprehensive systems (Morris and Brandon, 1988). However, today's improved technology (hardware and software), makes distribution of interest again.

With the increased interest in distribution came a renewed interest in systems integration. From the user's standpoint, the concept of integration implies that each system in the integrated group communicates with all others in a manner that promotes open access to data. In a truly integrated system all information processed is regarded as a single resource, available as needed, by any information system in the organization. Thus the systems in the integrated group function as a single entity (Morris and Brandon, 1988).

However, no single hospital system has achieved this level of integration. Further, continued enhancements of large-scale hospital information systems have proven to be a difficult, expensive and time-consuming process. Major improvements often require several calendar years to develop, test, document, install and train users. The healthcare industry is evolving so fast that systems that have been nurtured and maintained to the point where they are mature and stable often no longer meet the needs of providers. Conversely, systems able to meet these needs are either still in development or in early, unproved stages of operations (Grams, 1988).

Thus, the present computing environment in most hospitals may be characterized as a chaotic mix of centralized mainframes, independent or semi-independent minicomputers and an increasing number of PCs and workstations. Integrated groupings of systems may provide a core of support in certain major application areas, but there are few real ties between these and other systems, thus limiting data sharing and open access (Kerr and Jelinek, 1989). Healthcare organizations are marked by systems which run on a variety of hardware, lack common communication protocols, maintain redundant data and, as a whole, tend to under use their resources. Hospital management is generally frustrated by this overwhelming proliferation of diverse information systems including, in many cases, the independent departmental operations of micro- and minicomputers. This frustration intensifies when efforts are made to combine data from various systems in response to a variety of end-user information needs in the financial, administrative, and patient care areas (Lemon and Crudele, 1987).

Fortunately, there has been a recognition that standardization is needed in order to facilitate communications among diverse information systems and applications. In the mid-1980's, a small group of academic physicians and researchers concluded that further technical progress depended upon standards. A few years later, governmental agencies, vendors, users and consultants came to similar conclusions. A result was the formation of a number of working groups under such sponsorship as AAMSI (American Association for Medical Systems and Informatics) later the AMIA (American Medical Informatics Association), ASTM (American Society for Testing and Materials), IEEE (Institute of Electrical and Electronics Engineers), ACR/NEMA, and the ad hoc HL7 (Health Level Seven) committee which have begun developing standards for health care electronic data transmission (McDonald and Hammond, 1989; McDonald, Martin, and Overhage, 1991; Hume, 1989; Dunbar, 1990; Spitzer and Abelmen, 1990; Souhrada, 1989). Today's conference, which utilizes the work of ASTM's Task Group F30.03.03 on Emergency Medical Services Management Information systems is clearly a companion effort to these initiatives (Robinson, 1992).

While management has recognized the need for integrated information systems which can provide clinical and strategic information in a timely manner, this is not an easy task. Indeed, there are serious technological limitations and, as yet, no clear agreement as to how this should best be accomplished. What is agreed is that this will be neither a quick nor painless process. Resolution requires a long-term management commitment and a realistic plan to accomplish this goal.

A key to this process is careful planning. Healthcare management must delineate strategic and operational information requirements, assess existing systems (and recognize their limitations and weaknesses), anticipate alternative solutions including future technological changes and costs, and then develop a flexible, long range plan to achieve the objectives at a reasonable cost.

Kerr and Jelinek (1989) have identified five emerging trends which they believe will shape healthcare technology for the 1990s, and which are important to consider as a backdrop in carrying out the work of this conference. This is because almost all the advantages of a pre-hospital care information system in the areas of planning, evaluation, research and development will not be realized until these systems can be "seamlessly" linked to the hospital's emergency department and inpatient information systems. Indeed, EMS researchers and planners are reluctantly admitting that only for cardiac arrests, has pre-hospital intervention proven to be effective. In today's cost-conscious environment, those publicly supported services whose value can not be documented may see their funding becoming increasingly more problematic.

Thus the five trends for the 1990s:

- The healthcare executive will be required to manage a continuing debate as to the degree of centralization of the information systems network versus the distribution of independent systems.

- Integrated patient care information systems will extend to the points of care, further leading to the development of clinical and management support systems as well as advanced executive (and provider management) information systems.

- Industry standards for software, data structures, and interfaces will be established.

- An acceleration in the development of clinical decision-support systems which, through the use of expert systems technology, will become "advisors" in the care delivery process.

- An intense dependence on enhanced user interfaces and complex systems that encompass data, voice, video, and 3D graphics capabilities.

To a large extent these trends are in response to the haphazard growth in the application of computers to the healthcare system during the past three decades which has been described above. The first three are relatively obvious. The last two require some further discussion.

As noted, a trend that will be shaping future healthcare information systems is the accelerated development of clinical decision-support systems which, through the use of expert systems and applied neural network technology, will become "advisors" in the care delivery process. This, in turn, is being partially driven by the emphasis on quality of care, both outcome and process, which is becoming paramount in the 1990s. Toole and Campbell note that the hospital administration plays a key role in assuring the quality of process. If the "hospital can bring the right information in the right format to the clinical decision maker, he or she can in turn make clinical decisions that materially and positively impact cost". Thus new clinical decision-support systems will lead to improved quality which, in turn will result in increased productivity and competitive costs (Toole and Campbell, 1990). This also implies that the information systems of the future will revolve around and evolve from the patient medical record (Pollock, 1990). This is equally true in the pre-hospital environment.

Martin (1990) sees physicians increasingly demanding automated tools when making diagnostic and treatment decisions because the physician leaders of the next decade will have been raised and educated in a computer-intensive environment and will understand the critical

nature of these tools to the practice of medicine. This demand will mean that substantial computerized support for medical practice will be available by the mid-1990s. These automated tools can be expected to significantly enhance data manipulation and decision-support capabilities, and have serious ramifications for paramedics working in the field under physician supervision. Examples are already present in the pre-hospital market place (Cady, 1990).

A complementary prospective is given by Greenes and Shortliffe (1990), who view medicine in the 1990's as being characterized in large part by technological changes and the social and economic ramifications of these changes. Physicians will face the increasingly difficult tasks of dealing with competing priorities for resources, assessing the efficacy and cost-effectiveness of proposed diagnostic and treatment interventions, and justifying the decisions which are made. Greenes and Shortliffe are at the forefront of the new field of medical informatics "that concerns itself with the cognitive, information processing and communication tasks of medical practice, education, and research, including the information science and technology to support these tasks".

Finally, the fifth trend: An intense dependence on enhanced user interfaces and complex systems that encompass data, voice, video, and 3D graphics capabilities. The same forces which drive the development of clinical decision support systems also will motivate the healthcare professional to depend on the new technological products which, to a large extent, make the former possible. The critical issue is, how does one interface these new technologies to achieve innovative information and clinical decision support capabilities? Issues which must be addressed include: What information should be on-line? What should be archived; on what medium should it be archived? What are acceptable retrieval times for each type of information? What are the trade-offs and how should they be measured? For example, consider a physician reviewing all blunt trauma head injuries. An outlier case is found - if the relevant diagnostic information, including diagnostic imagines can be electronically retrieved from their storage media and displayed within a few minutes, then this type of feedback will lead to improvements in the quality of care process; if the information requires two or more weeks to retrieve, then that type of opportunity may be lost.

Comparable opportunities are available from the Intensive Care Unit, which has now been digitized. One result is the daily production of a large amount of information on each patient, which previously had been "thrown away". Should this information now be stored? What should be stored? What should be archived for research and teaching? Clearly, if we are interested in evaluating the effectiveness of certain field treatments for cardiac arrhythmias, then this type of capability could be of value.

Voice entry of data will provide another opportunity - by the mid 1990s the technology should be available to efficiently digitize voice entries into the medical record. This, combined with digitized patient monitoring, can lead to an immense information overflow if one is not careful. Now, not only will new interfaces be required, but they must provide a filtering process - e.g., What should be saved? Where should it be saved? How to best display it, given the availability of high resolution devices and 3D graphics? Healthcare information systems will be forced to move beyond the more familiar production areas (e.g., payroll, general ledger, billing) into the relatively unknown realms of medical records and treatment systems.

Pre-hospital Care Information Systems

Almost twenty years ago, a group of researchers at the University of Pittsburgh began to study emergency medical care systems, particularly, pre-hospital care. The original studies, funded by the then National Center for Health Services Research (NCHSR), were directed at the development of a series of planning methodologies for EMS systems. These methodologies included: statistical models for forecasting need and demand; mathematical models for determining the optimal placement of vehicles; a planning model for the location of coronary care units within a region; and a model for the optimal categorization of regional emergency medical facilities.

In beginning of this research, the need for having good data became apparent. Consequently, a major part of the early effort involved the design and implementation of a comprehensive *Pre-hospital Care Information System for Southwestern Pennsylvania*. The system was designed to supply timely information for provider management (e.g., response times, distribution of calls, nature of calls and patient types); documentation (i.e., providing a legal safeguard and up-to-date record of medical observations and treatments rendered); evaluation (e.g., effectiveness of funds spent in improving mortality and morbidity as part of state or regional initiatives; measuring achievement of goals and justifying programmatic efforts; case evaluations to identify and understand deficiencies in the way cases are handled; comparison with standards); regional planning (e.g., number, type and location of vehicles; number and level of personnel required); and research and development (e.g., effectiveness of certain procedures; skill maintenance strategies; effectiveness of certain drugs).

Indeed, to a large extent, the system did satisfy its five original objectives. We clearly demonstrated the types of things that could be done with such a system. The pre-hospital care providers within the 12-county Southwestern Pennsylvania region began utilizing the system in 1975. (See Figures 1 and 2 for a copy of the trip sheet.) At its zenith, 264 providers servicing more than 250,000 annual calls were utilizing the system. In addition, four other of the

Commonwealth's then nine EMS regions had adopted the system. Major funded studies that utilized the information system included:

- *Computerized evaluation of pre-hospital care* - sophisticated software was designed to evaluate the treatment process on a case-by-case basis. Using clinical algorithms which specified the recommended treatment for the different types of presenting patients, the computer could evaluate the care rendered relative to the recommended treatment for a given type of presenting patient. Those cases for which the treatment provided deviated significantly from that specified by the algorithms were identified by computer for in-depth medical review. (Supported by the now Agency for Health Care Policy and Research, DHHS.)

- *Computerized Pre-hospital Skill Deployment/Maintenance* - was an early in-depth examination of the skill decay phenomenon among paramedics providing pre-hospital care. Four aspects of the skill decay problem were addressed: (1) The demand for pre-hospital care as a function of the characteristics of the service area. (2) Given an estimate of the demand for pre-hospital care, how can that demand be translated into specific skill requirements? (3) Given the specific set of skill requirements, what will be the variation in skill utilization for the different structural forms of delivering pre-hospital care? (4) For a busy, urban ALS service, what is the rate of skill decay among paramedics, and is there a relationship between decay and field experience? (Supported by the now Agency for Health Care Policy and Research, DHHS.)

- *Rural Emergency Medical Services System Simulation* - involved the development and field testing of a computer simulation model, RURALSIM. Designed as an aid in planning and evaluating rural emergency medical services systems, the model was tested in Pennsylvania, Maine, Missouri, Oklahoma, and Nebraska as part of a DOT funded project. It evaluates various configurations of communications, demand, response, equipment, training, etc. for the particular system of interest. The results of this evaluation provide the planner with indicators that specify whether certain goals such as response time, method of response, percent patient improvement and others would be met for the various alternatives simulated.

- *City of Pittsburgh: Deployment of Pre-hospital Care Resources* was a computer simulation analysis to assist the City of Pittsburgh's Bureau of Emergency Medical Services in planning the allocation and deployment of its pre-hospital care resources. In performing this analysis, we relied extensively upon *The Pre-hospital Care Information System of Southwestern Pennsylvania* and *RURALSIM*. A number of different ambulance deployment strategies for the City of Pittsburgh were evaluated as part of this analysis.

- *Driving While Intoxicated: Use of Restraints and Severity of Injury* - investigated the relationship between the use of alcohol, as measured by the blood alcohol level, and the resultant severity of injury level after controlling for important intervening variables. In addition, the study explored the relationship between the use of active restraints, particularly seat belts and child/infant restraints, and the blood alcohol level. Data from *The Pre-hospital Care Information System of Southwestern Pennsylvania* was merged with police accident reports, hospital emergency department and inpatient data. This study was sponsored by the Alcoholic Beverage Medical Research Foundation.

- *Emergency Medical Services Management Information System* involved the design of a statewide EMS data system. Included in this design were: (1) the development of a statewide, advanced life support minimum data set that is compatible with the computerized model for evaluating pre-hospital care, and (2) the development of a set of basic life support algorithms and accompanying software that could be used statewide to evaluate basic life support care. This study was funded by the Commonwealth of Pennsylvania and U.S. Department of Transportation.

Yet, the system no longer exists in its original form nor scope. Due to limitations of funds and technology combined with little public, government and provider interest, the system has significantly diminished over the past ten years. The development and later disintegration of this pre-hospital care information system and the lessons learned from that process are relevant to the mission of this conference. Clearly, we set out to, and did create an information system which would satisfy multiple objectives. We are certainly gratified that much of what we designed into that system almost 20 years ago is included as part of the pending ASTM national voluntary consensus "Standard Guide for Establishing and/or Operating Emergency Medical Services Management Information Systems".

Of particular relevance to this conference is the last study noted above. We focused on defining a minimum data set, rather than a common form or uniform procedure for handling data.

Specific recommendations that needed to be considered in the development of a statewide pre-hospital care database included (Wolfe, Shuman, Esposito, Noe and Zavada, 1981):

- Adoption of a minimum data set for ALS with both mandatory and optional items.

- The development of a clearly specified, guaranteed method of funding data gathering and database management.

- A combination microcomputer-mainframe information system should be encouraged.

- Legislation is necessary to require all services to participate.

- The state should consider funding a coordinating agency which would provide assistance in putting a complete information system together.

All of these recommendations remain valid today. Clearly, a primary reason for the deconstruction of the Southwestern Pennsylvania System was the lack of third party funding to continue its support. Once economic conditions forced the system to become self-sufficient, it was doomed. Ambulance providers saw little justification for the information, even at $0.15 per trip. An attempt to incorporate a billing module in the system proved to be unsuccessful due primarily to the state of micro-computer hardware and software at that time, and the limited amount of "venture" capital to develop such a component. Even the region's major municipal provider was finally forced by politics and financial concerns to utilize the city's computer facilities rather than contract out to a third party. The result is that information, other than for billing purposes, is not processed in a timely manner.

Technology is no longer a limiting case. This paper was written on a personal computer which is as powerful as the mainframes we used in 1981. Today's personal computers are over 40 times faster than what we used ten years ago and have a similar increase in memory capacity. Software is now available to create sophisticated, user-friendly database applications, facilitating on-line data entry, retrieval, editing, etc. Ten years ago we envisioned having a microcomputer that would do much of the data entry tasks and provide simple reports. The more complex algorithmic evaluations and skill maintenance reports would be done on a central mainframe computer. This is no longer necessary. Almost all the analysis can be provided locally. If standard formats and definitions are agreed to, data could then be electronically sent to a central location and quickly incorporated into a comprehensive management information system.

However, financing remains a major concern. Woolhandler, Himmelstein and Lewontin (1993) have recently reported that administrative costs, including paperwork add 25% to the cost of hospital care. Given the present political climate concerning healthcare costs, will there be a willingness for the Federal and state governments to either pay for or mandate pre-hospital care information systems? This is the conundrum facing EMS: in order to evaluate, validate, monitor, research and demonstrate the effectiveness and justify the cost-benefit of various pre-hospital interventions, information systems which contain comprehensive,

standardized data elements and which are linked to hospital inpatient systems are needed. However, the cost of implementing and maintaining such systems may be beyond the current level of funding that we can expect. Yet, can we afford not to do this now? Johnson (1991) in discussing the future of pre-hospital care concluded:

> *Given current reimbursement trends, the increasing litigious trend in society, and the need for practical and responsive pre-hospital care, we must look to the future to refine what has been a glorious adventure.*

Myrick (1992) states the proposition clearly in his recent review of systems approaches in EMS:

> *Many researchers ... have advocated the development of better performance measures, particularly outcome-based performance. Most EMS system models use the process measure of response time, which is still considered a good proxy measure of system performance. However, it is difficult to make operational decisions based on response-time improvement... But how much better is this one-minute saving when related to overall system performance? ... In terms of cost-benefit, should an EMS system invest another million dollars to achieve an improvement in response time of one minute? These questions await better outcome measures for EMS systems which can be incorporated into appropriate systems models.*

Key Issues For The Conference

The organizers of this conference have postulated five questions that should be considered during these next three days. While I have touched on some of these questions above, it is worth re-iterating all of them.

The most important purposes of EMS pre-hospital data:

As discussed above, pre-hospital data is required for management (including billing), documentation, evaluation, regional planning, and research/development purposes. To date, pre-hospital data has served to primarily fulfill the first two purposes. However, as discussed above, issues related to evaluation, planning and research have become, and will continue to be equally as important.

Obstacles to uniform definition, collection, recording, analysis, and dissemination of pre-hospital EMS data:

Some of the obstacles to obtaining uniform data have been discussed above. Paramount is the issue of financing. It is complicated by issues related to local control. This latter factor is addressed quite well in the paper prepared by this Conference's Data Element Definition Task Group. They correctly point out that "few systems administrators or medical directors have abroad perspective or any

concern beyond problems and issues that they face within their own small sub-systems." Consequently, only questions of obvious local importance tend to be addressed. We have devoted a considerable effort to studying why some communities developed strong EMS systems while others floundered (Gunter, et. al, 1981; Ricci, et. al, 1979). Parochialism has been a major, underlying factor in impeding the development of EMS systems. Typically this parochialism is combined with a strong sense of independence and a healthy distrust of state and local governments that at times appear to act capriciously.

The design and development of management information systems to service the EMS community is also complicated by several other political factors. EMS regional and state agencies have often been given responsibility for system development with little or no accompanying authority. Further, as noted, funding for such information systems has rarely been adequate, primarily due to an apparently limited understanding on the part of state legislators of the complexity of EMS systems and the difficulty of obtaining and maintaining accurate information. Finally, many EMS agencies have not had the necessary technological expertise onboard or available through consultation agreements (Shuman, 1983).

Thus EMS agencies have been faced with an almost impossible task: the development of management information systems in an environment with little control, capital and expertise. It is not surprising that in 1983 we could find no good examples of comprehensive EMS management information systems currently operating. This situation has changed little in the past ten years.

Consequently, when combined with the agencies' and providers' extremely tight budgets, it is not surprising that data and information systems have suffered, and only information for management and documentation purposes is retained. In those cases where there was sufficient funding and where leadership adopted a broad, systems perspective, technical limitations often resulted in an inability to collect, collate, and return information in a timely manner. In failing to provide appropriate information promptly, the developing EMS information systems suffered unrecoverable credibility losses. In addition, the lack of a government mandate and uniform standards has created further obstacles.

Criteria to be used to decide whether or not a data element belongs in an EMS pre-hospital data set:

A procedure which works both "backwards" and "forwards" could be used to identify the elements that should be included in the EMS data set. Specifically, one would work "backwards" by starting with the appropriate administrators, planners and physicians who will utilize the resultant information. The purpose is to isolate those key strategic and tactical decisions which typically must be addressed and for which information is typically missing or

incomplete. That is, for each of the five major purposes of the system, determine the types of decisions that need to be made and the specific information, including its format and its timing that is required for each type of decision. In this manner, the decisions will drive the information. However, in using this type of process, it is important to consider the future directions of EMS and the resultant decisions that will have to be made.

The next step is to identify where that information should be best obtained, and whether it can currently either be accessed or is resident in an existing system. This latter will result from a "forward" study in which each existing "information" system within the area of concern, and the important interfacing areas is inventoried and the informational contents cataloged.

As part of this process, procedures for data exchange among information systems/sources should be assessed and/or designed. An important component of the "forward" analysis is the identification of particular data elements which are either input multiple times and/or not passed through the "network" of systems. Having identified these data elements, some effort should be devoted to evaluating alternative means of data capture, including such innovative mechanisms as bar coding and optical scanning devices in addition to the more traditional methods for data exchange.

For example, the draft ASTM Guide calls for recording the first, last and worst EKG readings and the five most significant medications given. What is the planned use of this information? Specifically, what questions will it help to resolve? While the EKG readings may enable an evaluator (including a computerized evaluator) to tease-out whether the patient improved or worsened during field treatment and transport, the evaluation may not yield precise information. Did the patient's condition worsen due to an improper treatment or medication? Did the patient improve (as measured by the cardiac arrhythmia) during field treatment and then worsen during transport? Will the listing of the five most significant medications provide any insight as to whether they were administered in proper sequence, and in response to a particular condition or arrhythmia? Will the evaluator be able to detail if the medication sequence was repeated as called for by the protocol? These are only two examples of the type of thought that must go into selecting data elements. (Note that in designing the *Pre-hospital Care Information System for Southwestern Pennsylvania*, we made specific provisions for capturing this type of information in time sequence in order to facilitate future evaluations and studies.)

Opportunities and obstacles to linkage of pre-hospital EMS data to data from other sources:

As discussed, the greatest potential opportunity involves linking pre-hospital data to emergency department and inhospital information in a "seamless" manner. By incorporating unique patient

identifiers, researchers would be able to access and evaluate the patient's complete medical treatment and response for the particular episode. By being able to determine the eventual patient outcome from a hospital database, we will be able to move beyond process and into outcome evaluation. Further, we will be able to develop other measures than response time and compliance. Obviously, the major obstacles to realizing this potential, involve the limited pre-hospital care information systems, the lack of standard identifiers, the willingness of the institutions to make such information available to evaluators and systems researchers while maintaining patient confidentiality and protecting institutional integrity.

How should recommendation on EMS pre-hospital data be implemented, evaluated and periodically updated:

Full implementation will require both incentives and continual reinforcements. The motivation for implementation will depend on both the usefulness and timeliness of the information, and the ability to procure funding for a significant portion of the cost. Further implementation will be driven by those who potentially influence the management of pre-hospital provider systems, such as accrediting bodies, national associations, insurance providers, third-party payers and regulatory agencies. Evaluation and updating can best be facilitated by those with a wide span of control, such as Federal agencies, their designated agents, or national associations. Information must be assessed to assure that it can be, and is being used for the purposes originally proposed.

Conclusion

In concluding, I would like to return to 1983. Then, at the *National EMS Management Information Systems Workshop* held in Harrisburg, I drew five conclusions from the papers which described existing information systems. To some extent, all have had to face each of these problem areas, which, after ten years, with minor modification, still remain relevant and of concern:

1. ***The trade-off between technology and obsolescence.*** The computer world is highly dynamic. New technological breakthroughs are being brought to market at an extremely rapid pace. Technology purchased last year already may have become outdated by new equipment. The situation is further complicated because software developers cannot keep pace with the hardware manufacturers, and, with limited standardization in the computer industry, particularly at the microcomputer level, it is difficult to move software among machines of different architecture (i.e.; IBM/Intel 486, Macintosh, UNIX workstations).

Consequently, system designers must carefully estimate the computer requirements of their proposed systems and select hardware which enables them to expand the capacity and/or capability as their requirements change.

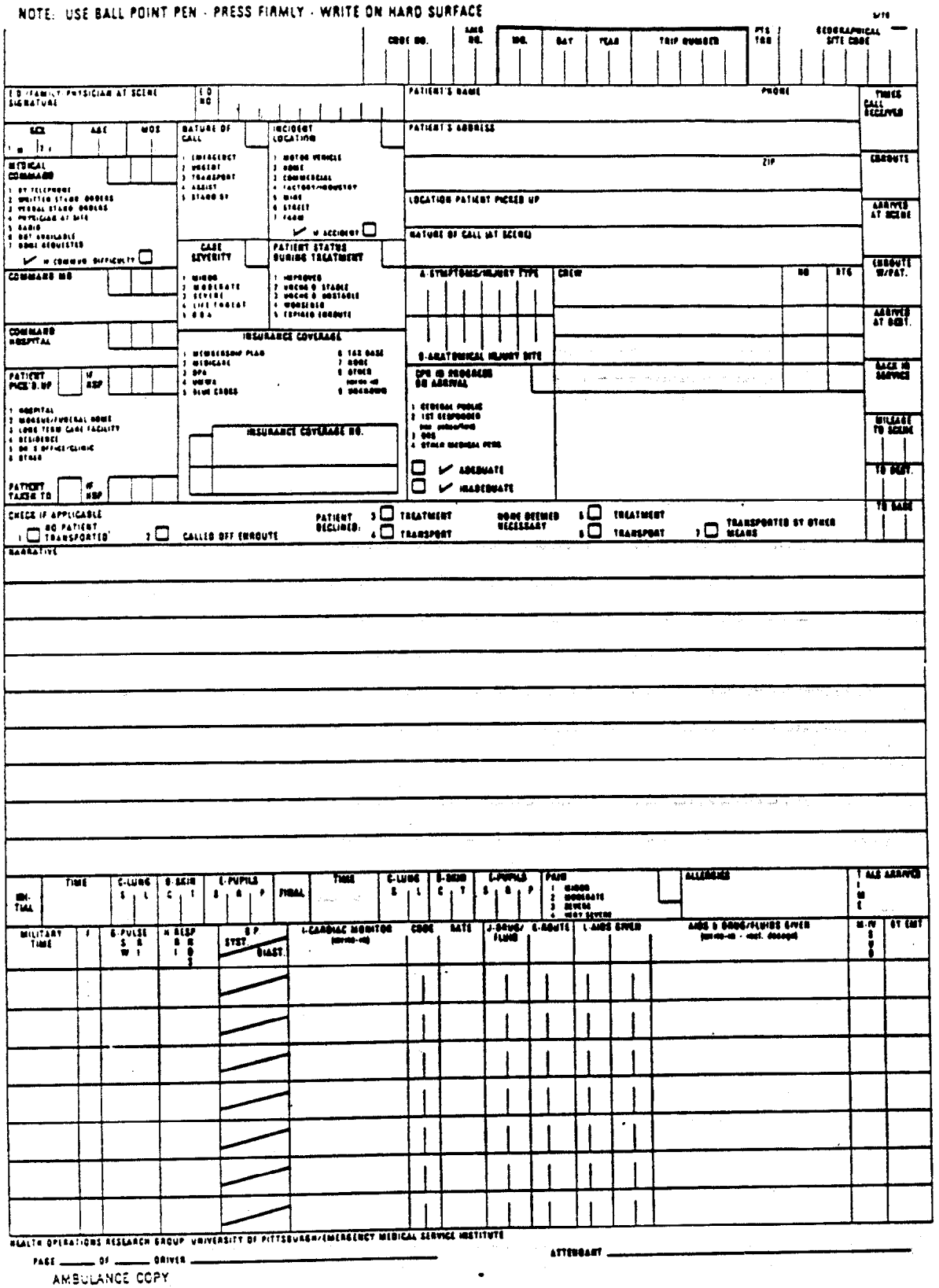
2. *Carefully examining the cost/benefit ratios involved in order to obtain the maximum bang for the buck.* It has been the rule that EMS management information systems will be underfunded. Thus, designers must carefully select the minimum set of elements that can be collected in order to produce the greatest return. That is, provide the most information. This requires that the decision inventory be well specified. Any planned evaluations also must be well specified. In reality this is not a simple task.

3. *The integration of micro with mini/mainframe computers.* A number of systems have started with inexpensive microcomputers. While this is a good way to proceed, unless these micros are linked (networked) to larger mini and mainframe machines at the regional and state levels, their maximum benefit will not be realized.

4. *The combining of databases.* In the EMS environment, pre-hospital care data must be linked with hospital discharge abstracts in order to determine outcomes; highway safety data (police accident reports) must be linked with pre-hospital care data to determine the severity of injury and the effect of particular traffic safety interventions. However, the linking of databases is neither simple nor straight forward. It is highly dependent upon the quality of information as well as the accessibility of the databases. Of particular concern is the belief that, unless forced to by legislation or the reimbursement system, hospitals may not provide EMS agencies with discharge abstracts which could then be used to evaluate the care of emergency patients.

5. *The EMT as the transducer of information.* By necessity, the basic building block of an EMS management information system will be the pre-hospital care data recorded by the EMT and paramedic. These data must be captured using similar procedures and standardized codes. EMTs must be trained to record data in a consistent, accurate and timely manner following uniform procedures and utilizing standardized definitions and codes. They must realize that data collection is important for medical, legal, evaluative, and research purposes. If pre-hospital care data are to be linked with hospital discharge abstract information, then it will be dependent upon the EMT in the field to provide the appropriate data for matching cases.

Figure 1: Pre-hospital Care Information System for Southwestern Pennsylvania



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PAGE ____ OF ____ DRIVER _____ ATTENDANT _____

AMBULANCE COPY

Figure 2: Pre-hospital Care Information System for Southwestern Pennsylvania

I _____ refuse treatment/transportation against the advice of the emergency medical attendants.

Date _____ _____ Patient's Signature

_____ Witness _____ Witness

(Patient refuses to sign) ☐

A - SYMPTOM INJURY CODES

01 Abrasion
02 Amputation
03 Asphyxiation
04 Avulsion
43 Bite - poisonous
44 Bite - non-poisonous
05 Burn - incl. thermal, chem., elect.
06 Cardiac Symptoms
39 Cardiac Arrest
07 Chills
08 Contagious disease
09 Contusion/bruise - minor trauma
10 Convulsions/seizure
unspec., petit mal, focal - site 00
systemic, grand mal - site 26
11 Crushing
42 Dehydration
12 Diabetic
13 Difficulty breathing/shortness of breath
14 Dislocation
41 Disorientation
15 Dizziness/fainting - weakness
16 Drowning
17 Electrical Shock
18 Fever
40 Foreign body - obstruction
19 Fracture
A - closed
B - open
20 Hemorrhaging
45 Hypersensitivity - incl. allergic rxn. to meds
21 Impairment - similar to that caused by alcohol
47 Insect bite/sting
22 Internal trauma (closed blood) - major
23 Laceration - cut
24 Mental disorder
25 Nausea
26 Obstetrics - delivery
27 Pain
28 Paralysis
46 Paresthesia (incl. numbness)
29 Penetrating/puncture wound (incl. stab)
30 Person (incl. drug overdose)
31 Person (other)
32 Projectile wound high velocity
(incl. gunshot)
48 Respiratory arrest
33 Shock
34 Sprain - strain
35 Stroke
49 Swelling
36 Unconscious
38 Vomiting

B - ANATOMICAL SITE CODE

01 Head
02 Face
03 Eye
04 Ear
05 Neck
06 Shoulder
07 Arm (upper)
08 Elbow
09 Forearm
10 Wrist
11 Hand
12 Fingers
13 Back
14 Chest
15 Abdomen - GI
16 Pelvis
17 Buttocks - perineum
18 Hip
19 Thigh
20 Knee
21 Leg (lower)
22 Ankle
23 Foot
24 Toes
25 Genito-urinary
26 Systemic
27 Upper respiratory tract/airway

C - LUNG CODES

SOUNDS
1 Clear
2 Stridor
3 Rales - incl. wheeze, ronchi
4 Diminished
5 Absent

LOCATION
1 Bilaterally Equal
2 Right
3 Left

D - SKIN CODES

COLOR
1 Normal
2 Cyanosis
3 Pale, ashen
4 Flush

TEMPERATURE
1 Normal
2 Hot, dry
3 Hot, wet
4 Cool, dry
5 Cool, wet

E - PUPIL CODES

SIZE
1 Equal
2 Unequal
3 Med./surg. anomaly

REACTIVITY
1 Reactive
2 Not reactive

POSITION
1 Midposition
2 Dilated
3 Constricted

F - CONSCIOUSNESS LEVEL

1 Alert & oriented
2 Disoriented
3 Response to verbal stimuli
4 Response to pain stimuli w. purpose
5 Response to pain stimuli w/o purpose
6 Decorticate/decerebrate (rigid)
7 Flaccid/unresponsive

G - PULSE CODES

Include both Character and Regularity with Rate.

CHARACTER
S - Strong
W - Weak

REGULARITY
R - Regular
I - Irregular

H - RESPIRATORY CODES

Include both Rhythm and Depth with Rate.

RHYTHM
R - Regular, smooth
I - Irregular

DEPTH
N - Normal
D - Deep
S - Shallow

I - MONITOR CODES

01 N.S.R.
02 Sinus tach
03 Sinus brad
04 Sinus arrhythmia
05 S. A. arrest
06 Wandering pacemaker
07 P.A.C.'s
08 P.A.T.
09 Atrial flutter
10 Atrial fibrillation
11 P.V.C.'s --
12 AV nodal tach
13 Nodal rhythm/junctional
14 SVT
16 1st° A.V. block
17 2nd° A.V. block T-1
18 2nd° A.V. block T-2
19 3rd° A.V. block
20 PVC-5 or less per min.
21 PVC-6 or more per min.
22 PVC on T-wave
23 PVC - Bigeminy
24 PVC - Trigeminy
25 V. tach
26 V. fibrillation
27 Asystole
31 Idioventricular rhythm
32 EMD - electro mech. disoc.
98 Other (explain on form)

J - DRUG/FLUID CODES

03 Atropine
06 Calcium chloride or gluconate
20 Corticosteroids
10 Dextrose in water - 5%W
19 Dextrose in water - 5%W/Glucose
11 Dextrose in saline
12 Dextrose in ringers lactate
21 Diazepam (Valium)
22 Diphenhydramine HCL (Benadryl)
16 Dopamine
05 Epinephrine
18 Furosemide (Lasix)
23 Ipecac
07 Isoproterenol
01 Lidocaine HCL
06 Metaraminol (Aramine)
15 Naloxone (Narcan)
08 Narcotic (excl. M.S.)
24 Nitroglycerine (NTG)
25 Nitrous Oxide (NO_2)
26 Oxygen
17 Pheniramine
13 Ringers Lactate (RL)
14 Saline (NSS)
04 Sodium bicarbonate
98 Other

K - MEDICATION ROUTE

50 Endotracheal
51 Intramuscular
52 Subcutaneous
53 Oral
54 Sublingual
55 Suppository
56 IV bolus (push)
57 IV infusion (drip)
58 Inhalation
59 Topical
98 Other

M - IV

S - Successful
U - Unsuccessful
D - Discontinued

L - AIDS GIVEN

03 Aspirate (suction)
37 Blood drawn
09 CPR
07 Cervical collar
08 Control bleeding
09 Defibrillation
10 Demand Valve
11 Dress wound
29 EKG transmitted
12 Esophageal Obturator Airway
13 Extricate patient
34 Ice pack
39 Irrigate with water/saline
15 MAST trousers
17 OB delivery
18 Oropharyngeal airway
19 Orthopedic stretcher
04 Passive Pres. Ventilation (excl. demand valve)
36 Precordial thump
22 Psychiatric intervention
23 Restrain patient
24 Rotating tourniquet
25 Sand bags
26 Sling
27 Spine board (3 ft.)
28 Spine board (6 ft.)
30 Splint - incl. on board other
42 Stretcher
35 Stretcher
40 Thrust - abd./chest
38 Tourniquet
31 Tracheal intubation
32 Traction splint
41 Valsalva maneuver
98 Other

References

Bognanni, Sal and Mark H. Epstein, "Establishing Statewide and Communitywide Health Information Systems", *Topics in Health Records Management,* 12(4), 1992, pp. 17-24.

Brown, Doug, Drew Dawson, Dan Pollock, Becky Yano, Rick Cales, Chris Kaufman and Dan Spaite, "Pre-Hospital EMS Data Element Definition Development: A Report From the Uniform Pre-Hospital EMS Data Element Conference", prepared for the National EMS-MIS Consensus Development Conference, August 1993.

Cady, Geoffrey A., " EMS Enters the 21st Century: *JEMS* Software Review", *JEMS,* May 1990, pp. 59-65, 70-71.

Carter, Kim, "Patient Care Computer System Vital to El Camino", *Modern Healthcare,* 17(19), 1989, pp. 84-86.

Dunbar, Carolyn, "The Networking Standards Evolution: Toward a Real Electronic Medical Record", *Computers in Healthcare,* 11(2), 1990, pp. 18-21.

Eckholm, Erik, "Study Links Paperwork to 25% of Hospital Costs", *New York Times,* August 5, 1993, p. A8.

Greenes, Robert A. and Edward H. Shortliffe, "Medical Informatics: An Emerging Academic Discipline and Institutional Policy", *J. of the American Management Association,* 263(8), 1990, pp. 1114-1120.

Grams, Stanley, "The Future of Health Care Information Systems", *J. of Health and Human Resources Administration,* 11 (3), 1988, pp. 194-217.

Gunter, Margaret, Larry Shuman, Gerald Esposito and Edmund Ricci, *Organizing, Financing and Managing the Pre-hospital Care Systems,* Final Report to the Robert Wood Johnson Foundation, Graduate School of Public Health, University of Pittsburgh, June 1981.

Hume, Susan, "The Hospital of Here and Now", *Health Progress,* 70(8), 1989, pp. 55-57, 70.

Johnson, John C. "Pre-hospital Care: The Future of Emergency Medical Services", *A. of Emergency Medicine,* 20(4), April 1991, pp. 426-430.

Kerr, John K. and Richard Jelinek, "Impact of Technology in Health Care and Health Administration: Hospitals and Alternative Care Delivery Systems", *J. of Health Administration Education,* 8(1), 1990, pp. 5-10.

Lemon, Robert, and John Crudele, "Systems Integration: Tying It All Together", *Healthcare Financial Management,* 41(6), 1987, pp. 46-52.

Martin, James B., "The Environment and Future of Health Information Systems", J. of Health Administration Education, 8(1), 1990, pp. 11-24.

McDonald, Clement J. and William E. Hammond, "Standard Formats for Electronic Transfer of Clinical Data", *A. of Internal Medicine*, 110(5), 1989, pp. 333-335.

McDonald, Clement J., Douglas K. Martin, and J. Marc Overhage, "Standards for the Electronic Transfer of Clinical Data: Progress and Promises", *Topics in Health Records Management,* 11(4), pp. 1-16, 1991.

Morris, Daniel C. and Joel S. Brandon, "Future Integrated and Interfaced HIS Systems", *Computers in Healthcare*, 9(10), 1988, pp. 50-53.

Myrick, Justin A., "Systems Approaches in Emergency Medical Services: The History, the Impact, and the Future", *J. of the Society for Health Systems*, 3(4), 1992, pp. 37-47.

Pollock, Ellen, "Then and Now: How Far Have We Come? Part I", *Computers in Healthcare*, 11(3), 1990, pp. 24-31.

Ricci, Edmund, Larry Shuman, Gerald Esposito, Ian Rawson, Margaret Gunter and Myrna Silverman, *Case Studies in Community Decision Making: The EMS Experience,* Final Report, Graduate School of Public Health, University of Pittsburgh, 1979.

Robinson, Perry, *Standard Guide for Establishing and/or Operating Emergency Medical Services Management Information Systems,* ASTM Task Group F30.03.03 Draft 920501, May, 1992.

Shuman, Larry, "Data Sources and Systems Design", paper presented at the National EMS Management Information systems Workshop, Pennsylvania Department of Health, Division of Emergency Medical Services, Harrisburg, Pennsylvania, October 16-18, 1983.

Souhrada, Laura, "Purchasing Trend - EDI: Electronic Management is Almost a Reality", *Hospitals,* 63(23), 1989, pp. 65-70.

Spitzer, Peter and Arnold Abelman, "HL7, MEDIX and the Pursuit of the Single Standard", *HIMSS News,* 1(1), 1990, pp. 3-4.

Toole, Jay E. and Susan L. Campbell, "The Decade Takes Shape: Computers in Healthcare for the '90s", *Computers in Healthcare*, 11(3), 1990, pp. 20-22.

Wolfe, Harvey, Larry J. Shuman, Gerald Esposito, Anna M. Noe, and Chalice Zavada, *Emergency Medical Services Management Information Systems: Development of ALS Minimum Data Set and BLS Algorithms*, Health Operations Research Group, School of Engineering, University of Pittsburgh, August 1981.

Woodhandler, Steffie, David U. Himmelstein and James P. Lewontin, "Administrative Costs in US Hospitals", New England Journal of Medicine, 329(6), 1993, pp. 400-403.

Appendix: Management Information Systems

This Appendix has been updated from the paper by Larry J. Shuman, Ph.D. "Data Sources and Systems Design", which was presented at the National EMS Management Information Systems Workshop, Pennsylvania Department of Health, Division of Emergency Medical Services, Harrisburg, Pennsylvania, October 1983.

A management information system (MIS) provides management with the information needed to intelligently make and execute decisions. A comprehensive MIS should provide the information required by the various levels of the organization to establish basic goals and objectives. Information systems usually incorporate both internal and external sources of data where "data" is defined as unevaluated or unorganized facts. Information can then be defined as data which have been evaluated for use in a particular situation or class of situations.

Typically, managers have had insufficient relevant information for making decisions. However, computerization can result in the manager's having too much information or too many items of data. The proliferation of computerized information can result in clogged communication channels. Unless information is presented to the manager in a manner which readily allows the crucial or abnormal to be culled from the routine, the manager may become overwhelmed by reports and consequently rendered ineffective by the lack of relevant information.

The role of the MIS is to provide managers with the information which they need in order to be effective managers. This must be achieved with reasonable cost, accuracy, and speed. This has not been easy to accomplish in the private sector; it has been even more difficult to achieve in the EMS environment where both financial limitations and parochialism have combined to greatly impede success.

Note that the MIS is not a series of independent subsystems; i.e., a set of incompatible and/or independent computerized information systems do not constitute an MIS. A comprehensive MIS must have an integrated database - a common pool of data in standardized form which can be drawn on by the different subsystems and different managers in the various functional elements of the organizations which will utilize the system. Each request for information requires the use of some common data elements plus auxiliary data. Therefore, an integrated database involves the recording of information in primitive or basic terms so that it can be used in the broadest possible manner. Once data are captured and recorded, they cannot be further decomposed.

In designing an MIS, the relative costs and benefits of each data element which will be incorporated into the database must be

evaluated. Each item should be assessed in terms of (1) its information content (i.e., the benefits which will accrue from having it) and (2) its cost (the resources which must be devoted to incorporating the particular item into the database and the associated cost of updating). This is the critical trade-off in the design of an MIS. Data must be considered in terms of the decisions and situations in which they will be used. Rather than collect everything that may be of interest or might have potential, the system designers must determine how crucial each item is to the situations of concern and how important the various scenarios or decisions are to achieving overall objectives. Balanced against the value of the information is the total cost of including that information in the system.

If this concept is not applied in the design and development of the information system, the result will typically be a proliferation of data that makes the system unmanageable. In contrast, an overly cost-conscious designer can impose arbitrary limits on the amount of data that are captured. The result is a sparse database of little value. Thus, the importance of systematically evaluating the trade-off between the utility of the information and its cost cannot be over emphasized. Unfortunately, within the EMS environment, this important trade-off has been typically ignored as both state and Federal agencies have specified data elements with little apparent concern about how they are to be collected or used.

We can specify seven basic phases for the design and development of management information systems as formulated by the American Society of Testing Materials (ASTM) Committee E-31. (See ASTM Standard E 622-84, Annual Book of ASTM Standards, 1993, pp. 150-152, and referenced ASTM documents.) These seven phases, which provide a standard generic guide for computerized systems, are:

1. *Project Definition:* This phase includes those actions necessary to initiate the project and obtain agreement among users, implementers, and managers as to the scope of the project. The primary purpose of this phase is to permit all interested parties to formulate a mutually agreeable definition of the project in terms of a general statement of goals, objectives, and constraints. The basic information contained in the definition should come from all pertinent sources, including managers, unit supervisors, system users, and end users of the system's output. Goals must be explicit, compatible, and operationally obtainable. Broad participation in this phase greatly facilitates the success of the project.

2. *Functional Requirements:* This phase specifies what the system is required to do, in sufficient detail so that the system developers can either prepare a functional design or select a commercially available system. The functional requirements documents contain an overview of

the project, its objectives, and financial, time, and manpower constraints. They describe the required control functions, characteristics of the input data, data manipulation and output requirements, technical requirements, human interfaces, and the basis for system evaluation.

The needed information is obtained from the managers, supervisors, individuals who will utilize the computerized system, users of the system's results (output), and the software and hardware personnel who will maintain the system. The functional requirements should not specify any particular hardware nor software; these selections are made in the implementation design phase.

3. *Functional Design:* This phase describes the system inputs and outputs, human interactions with the system, timing relations, and data reduction algorithms. The functional design is an exact, concise description of the functions required in the proposed system. Development of a functional design requires a rigorous review and verification process taking into consideration the function requirements, the project goals, and the constraints imposed on the project. The resultant functional design is a translation of the functional requirements into a form characterized by inputs, outputs, and transfer relationships. Its completion is a necessary step in translating the functional requirements into a form appropriate for the task of implementation. During this phase, an in-depth analysis of the information requirements is conducted. The specific information elements which are the potential inputs to the system must be evaluated in terms of their relevance to the objectives. Using the decision inventory as a guide, the information requirements are evaluated on a cost-benefit basis. Each is assessed in terms of the total cost of incorporation and continuous updating and monitoring. Also included in this phase is the development of the database.

4. *Implementation Design:* During this phase systems designers utilize the functional requirements and design documents to produce an implementation design. The format of the functional design typically allows for several implementation designs; a number of alternatives are often possible and must be explored by the implementation groups. A successful implementation is the result of an iterative process which requires frequent communication between users, designers, and implementers. It is expected that the implementation design process will uncover inconsistencies among goals, constraints and functional requirements. When this occurs, those

documents should be corrected and approved by the appropriate individuals.

Regardless of the specific implementation design, the original or updated functional requirements should be met. However, there is a limit to which the strict systems approach can be followed. At some time in the project, implementation becomes dominated by experience, professional intuition, and such system constraints as time, funds, and manpower resources.

During this phase, software and hardware requirements are specified. Software requirements involve the detailing of the programs necessary to operate the system. A true MIS must do more than develop routine reports. It must be capable of exception reporting and providing information for special analysis and decision making. The hardware requirements are concerned with the specifications of the actual equipment to be used for the system. Technical environmental, and cost considerations must be taken into account, as well as human interface issues.

5. *System Assembly:* This phase includes all the activities required to build a working system, such as acquisition of components and purchase and development of hardware and software. Construction techniques and hardware debugging should follow appropriate industry standards and sound engineering practice. Software development and debugging standards are less well-established. This makes debugging of software in a systematic manner more difficult.

   System assembly also includes checkout of the system, correction of any problems, and production of final documentation including operating instructions, schematic and interconnection diagrams, flow chart, software listings, and troubleshooting procedures. It also involves installing and testing the system at the desired field site.

6. *System Evaluation:* This phase addresses the success of the system in meeting the needs of the organization and providing the capability and potential for future expansion. This evaluation determines if: (1) the installed system meets the needs specified in the functional requirements and the needs of the user organization; (2) the system meets the requirements that were written down; (3) the system meets the requirements that should have been written down; (4) some of the compromises made during system design and implementation would have resulted in a better system if another alternative had been chosen; Was the design concept proper? Would it be appropriate for a future

installation? (5) the system has capabilities and potentials beyond the original functional requirements.

The formal *system evaluation* process enables the development of better functional requirements in the future. While it is not an acceptable testing procedure, it recognizes and emphasizes the need for acceptance testing in other phases.

7. ***System Documentation:*** This is an ongoing activity throughout the entire project. Information is compiled from project inception to final evaluation. It encompasses information needed by everyone concerned with the development, purchase, operation, or evaluation of the system. Documentation for the various developmental stages should be produced for different levels of interest. These include management, systems designers, vendors, plant engineering, implementers, operators, other information recipients, data collectors, and maintenance personnel.

APPENDIX C

PLENARY SESSION PAPER

OVERVIEW OF THE DATA ELEMENT DOCUMENT

BY THE

DATA ELEMENT TASK GROUP

OVERVIEW OF THE DATA ELEMENT DOCUMENT BY THE DATA ELEMENT TASK GROUP

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The following was prepared from a recording of the address by Daniel Spaite, M.D. as spokesperson for the Data Element Task Group, to participants and faculty of the Uniform Pre-hospital EMS Data Consensus Conference held in Arlington, Virginia on August 16 - 18, 1993.

Introduction

My task today is to present the issues that the Data Element Task Group addressed, to discuss the charge from the Conference Planning Committee to the Data Element Task Group, and to incorporate into this consensus conference some information about five very important key issues involved in pre-hospital data collection and the consensus process.

Emergency medical service (EMS) systems today have a few tenets which we all tend to accept:

1. That there are pre-hospital interventions that, if carried out efficiently, will impact on the morbidity and mortality of critically ill and injured patients, that can not be reproduced even if the subsequent hospital care is optimum;

2. That pre-hospital care impacts patient outcome, not independent of hospital care, but in such a way that one can not recover what is lost in the pre-hospital setting if the in-field care was not proper and efficient; and,

3. That the need for pre-hospital data element uniformity, in a form like the one we are proposing here, is essential.

Although the EMS community believes that these tenets are true, we cannot prove them. For example, the cost-effectiveness question aside, we do not know what EMS systems cost. We do not even have the building-blocks to determine cost-effectiveness. Finally, while we all believe that EMS has a profound impact on the outcome of medical emergencies; in fact, we have no proof that pre-hospital care makes any difference (except for cases of non-traumatic cardiac arrest). To summarize, there is a vast disparity between what we believe about the efficacy of EMS and what we have been able to prove.

What that gives us is a fundamental charge for this consensus conference because the most fundamental need for improving EMS is no longer another ambulance or another helicopter. The most fundamental need in EMS today is the ability to prove the efficacy of EMS, based on data. To do this, we need first to collect accurate pre-hospital data from all types of systems, not just a few sophisticated urban systems that happen to have set up a research program. Such data need to be compiled at regional, state, and national levels. The failure for this to occur will have a profoundly negative impact. In my summary I will give my opinion of what the future of EMS is unless we are able to meet this fundamental need.

The following is a brief overview of how we got to this point in the consensus process. The National Highway Traffic Safety Administration (NHTSA) invited eight other interested Federal agencies to co-sponsor this conference. Working as a Coordinating Committee, representatives from these agencies convened a planning committee, which included members from Federal as well as non-federal stakeholder groups, to help plan this conference. The American Academy of Pediatrics (AAP), American Ambulance Association (AAA), American College of Emergency Physicians (ACEP), American College of Surgeons (ACS), American Hospital Association (AHA), American Society of Testing Materials (ASTM), EMS Data Systems, the National Association of EMS Physicians (NAEMSP), National Association of Emergency Medical Technicians (NAEMT), National Association of State EMS Directors (NASEMSD), and the National Council of State EMS Training Coordinators (NCSEMSTC) were all involved through representation in the planning process, and in the determination of what consensus process would be utilized.

The planning committee decided on the ultimate composition of the consensus panel, which included a State EMS Director, a State EMS Training Coordinator (each designated by their associations); a private ambulance service manager; a public fire-based EMS service manager; a regional EMS manager; an EMS medical director (NAEMSP); an emergency physician (ACEP); an emergency nurse (ENA); a trauma systems director (ACS, Committee on Trauma); an epidemiologist; an EMS researcher; and the panel chairperson, who is a pediatrician.

When this group of 30 or so people assembled, they realized that a group of this size was not going to be able to produce the document with the data elements. Therefore, the group identified a seven member Data Element Task Group which was willing, with NHTSA assistance, to spend several hundred hours over six months to develop the draft data element document. The Data Element Task Group was also asked to document, for the conference, the questions and issues that should be considered in defining a set of uniform pre-hospital EMS data elements.

Purposes for Pre-hospital Data Collection

There are a number of important purposes for the collection of pre-hospital EMS data. The fundamental and primary purpose of pre-hospital data collection, apart from any other issues, is the legal documentation of the medical record. Billing is a very important aspect of pre-hospital data collection. Many of the EMS systems in this country are developed and maintained by billing for the services provided to the patients. Also, the data that are collected in the field are the foundation of quality improvement programs. System evaluation, in the generic as well as the research sense, is fundamentally dependent upon pre-hospital data collection.

Outcome analyses and cost-effectiveness research are also important purposes for pre-hospital data collection. To date, there are only four cost-effectiveness analyses in the peer-reviewed literature about EMS which are specific to pre-hospital care. Epidemiology and public health needs also are important purposes for collecting pre-hospital data. Increasingly, pre-hospital data systems are being considered as "population-based sources" of information, especially for injury, but also could be used for other types of disease surveillance. However, most people who establish EMS data collection systems know little about public health models and have little or no training in epidemiology. Finally, justification for allocation of resources to EMS is an important purpose for collecting EMS data. The need for justification of resource allocation for EMS may become the most persuasive reason for the collection of uniform pre-hospital EMS data based on the definitions and recommendations that we develop, and the actions that we take during and subsequent to this consensus development conference.

In 1973, the EMS Act mandated that there would be uniform data collection around the country. Federal contracts helped to start that process. However, a minimum data set developed out of that Act never reached widespread use. A number of obstacles to uniform pre-hospital data collection have been identified:

1. EMS system management, maintenance, development and medical direction are all under the control of state and local governments, and no one would argue that it should be otherwise. The people involved in EMS data collection have a job to do in their local area. Therefore, the people who collect EMS data have little interest in collecting data that can help answer broad questions of interest to researchers, system administrators, or relevent Federal agencies and policy makers. Unless an issue is of local importance, few people have interest in collecting data about it. This lack of a sense of national or global responsibility has lead to America's EMS being provided by thousands

of small EMS groups that have no meaningful interaction, have developed their own paradigms, their own interests, and their own data sets. The failure of these groups to interact through uniform data collection and reporting has been the primary and most fundamental obstacle to uniform data collection.

2. The most obvious obstacle to establishing a uniform pre-hospital data collection system is financial. Establishing regional, state, and Federal EMS reporting systems would be enormously expensive. Even if the finances were available, very few local EMS systems have the informatics expertise to assemble and coordinate the technology, the medical issues and the data elements and the definitions.

3. In addition to the financial and medical informatics obstacles, the issues of what to do with that database, how to analyze it, and how you get good epidemiological or cost-effectiveness analysis out of the data sets remain. Only a handful of agencies across the country have developed a relationship with institutions that have the research expertise to make use of the data.

4. Finally, lack of a national consensus on the resolution of these obstacles is not a trivial obstacle to overcome. This consensus conference represents an attempt to overcome this obstacle.

All of the potential justifications for the inclusion of a data element within a set of essential and desirable uniform pre-hospital EMS data elements were combined into six broad areas. These areas are:

1. The patient medical record

2. Billing or other financial issues

3. Epidemiology

4. System evaluation and research

5. Quality improvement program

6. Medical/legal

To be included in the data set as an essential data element it must be necessary for the medical record. The data elements in the pre-hospital patient care record have several purposes. They provide:

1. legal/medical documentation;

2. demographic information; and
3. they serve to document the response of the EMS system to the individual patient

There are two potential sources of information for the data elements that may be included in the patient care record: (1) the person providing the service, and (2) by record linkage with the dispatch records. From an overall perspective, determination that an available data element is a required part of a patient care record is based on its need for medical management of the individual patient and of the patients as a whole within a system. Thus, the need for the data element for the individual medical record and the "system medical record" are what determine if a potential data element should be included as essential in the data set.

The rationale for a practical, rather than a research focus on the identification of essential data elements is to facilitate their widespread acceptance. If data elements were considered essential only because they were needed for research or evaluation, then the likelihood of widespread acceptance would be compromised. There will be certain data elements that will be very important, for example, to the medical director of a large EMS system. They might like to see everyone else collecting the same data. However, if the only reason for collecting certain data is for research or evaluation, then the data collection would be doomed to failure because so many EMS agencies do not have the capability to incorporate research issues at this time.

Some might wonder why there is a need to recommend the collection of essential and desirable data elements at all? Why not just develop a "minimum" data set? There are several reasons for this. First, the essential elements are extremely important for quality improvement and systems evaluation. Second, there are many systems that are already collecting many or all of the suggested essential and desirable elements, and to produce a document that excluded 30 percent to 50 percent of the elements that are being collected by some systems may discourage those systems from continuing to collect the data. Third, having an inclusive rather than an exclusive data set will serve to move EMS data collection forward. Having a document like this may encourage the provider to add some data elements that they previously may not have considered if there was only a minimum data set. Finally, it may provide a pool for potential elements as this process repeats and improves, and gets studied and evaluated.

If we tried to address the issue of linkage with other databases in this consensus conference, it would take three months rather than a three days. However, it is important to understand that, while we will not address linkage in this conference, excellent pre-hospital data collection is necessary, but not sufficient to answer questions about patient outcome. The recommended uniform pre-hospital EMS data set should be viewed as a building block in

a continuum of an entire structure that needs to be built. Although what is happening at this conference is essential, it is not sufficient for what must be done in the long run. Unlinked pre-hospital data have limited value.

The obstacles to linkage are several. They include:

1. Issues of patient confidentiality and EMS personnel and EMS agency confidentiality are always raised as major concerns and considerations whenever there is talk about linking data from one database to another.

2. The cost of linkage has been prohibitive, but the technological changes that have been seen in medical informatics may reduce the cost of record linkage.

3. The complexity of informatics in linking varied types of paper- and electronic-based informatic systems, have been an obstacle. This complexity is enormous, but improving.

4. There are few people in the country who understand both EMS and epidemiological research models. The failure to be able to combine that expertise has been a serious obstacle to linkage because, even if the resources are made available and the linkages are formed, there will still be the question of what it all means.

What will be the future and the implementation of the recommendations that come out of this consensus conference? First of all, this consensus process is only a beginning, and it must be viewed that way. Second, the evaluation of the uniform data set must begin immediately because we are "making it up as we go". There is no research to help us decide the best data to collect. We have assembled a group of experts who are going to help us make our best guess of what the uniform data set ought to be, but, as soon as that is done, the testing and research needs to occur immediately in frontier, rural, suburban, and urban areas.

The issue of electronic and paper formatting is beyond the scope of this consensus conference, but it is an important aspect of the future implementation of the conference recommendations. The issues of reporting to regional, state and Federal agencies is an important one because such reporting is going to have to be voluntary. Therefore, given the thousands of EMS systems, few of which see the need to pool their data, issues of how to report and of how to encourage people to report, while being fully voluntary, are going to be very important to address and resolve.

Finally, the issue of the success of this effort is of concern, because if it works, and a consensus develops around a uniform data set, then we will have to address other problems related to completeness and quality of data. For example, suppose that we

come up with a consensus on a uniform data set and every EMS agency in the entire country collects and reports the recommended data elements. Let us also assume that there is a central repository to store the data. There is currently no way to document the accuracy of the data. There are inherent problems with in-field data collection that we will not even touch on, but which include such factors as:

1. The assumptions of what data are actually available to us may be wrong.

2. Providing a good data collection system does not guarantee good data collection.

3. Human factors may be more important than structural factors. No matter how dedicated we may become to data collection the reality is that we are expecting people to do repetitive, boring tasks, in the middle of the night, perhaps just after they were shot at. Human factors are incredibly important and may be more important than structural factors. However, that is not a reason to prevent us from moving forward with what we are doing. We must just face the fact that data collected under practical field conditions may be neither complete nor correct.

4. We may be collecting the wrong data.

5. Our methods of data collection are sub optimal.

6. Much of our data rely on perceptions and estimates.

7. In different systems the problems may not be the same. The variations that occur in different systems are limitless.

Summary and Conclusions

If this consensus development process results only in the collection and reporting of a large amount of bad data, then it will simply lead to bad conclusions that are believed more fervently. We need to be honest enough with ourselves that if we go away with a uniform data set, and we do not immediately begin to evaluate the impact of that data set, as well as its completeness and accuracy; we will all believe that whatever we develop is the truth. We have to make sure that the data are good.

The current situation that we are going to try to fix is that there has been no uniform data set, and that has meant no answers to outcome questions. No answers to outcome questions has meant no proof of cost-effectiveness. The consequence of no proof of cost-effectiveness means no justification of cost, and,

increasingly, no justification of cost will mean loss of societal resources. Thus the outcome of our efforts may determine the survivability of EMS.

The reality is that there are major changes that are going to happen in U.S. healthcare and it would be naive to think that the pre-hospital components of health care will not be impacted by this change. The facts that are before us are that the relative availability of societal resources for each potential need will decrease. Resource allocation will become increasingly based upon the ability to objectively and convincingly prove efficacy of a given service. Medicine in general, and EMS specifically, is becoming increasingly ill-prepared to effectively compete for societal resources.

I believe, as many of you, that EMS is one of the most cost-effective health services available from the perspective of over-all societal benefit. I also believe that EMS is one of the most underfunded services compared to its societal benefit. But, we must admit that currently EMS is enormously overfunded compared to our current ability to scientifically justify its efficacy from a societal resource perspective. The result of that is that if we do not start to do good systems research soon, and in large quantities, EMS in its current form will cease to exist.

So, these are the questions and issues that have brought us here and that should cause us to do our best on the task at hand and to carry these considerations with us in the implementation of the outcome of this Conference.

APPENDIX D

CONFERENCE FACULTY CURRICULUM VITAE

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Chairman, Department of Emergency Medicine, Portland Adventist Medical Center, Portland, OR
Medical Director, Office of Emergency Medical Services, Orange County, CA
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ORGANIZATIONS/APPOINTMENTS

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American Society for Testing and Materials
American Trauma Society
Association for Medical Emergency Informatics
National Association of Emergency Medical Services Physicians
National Study Center for Trauma and Emergency Medical Systems
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Emergency Care Quarterly, Aspen Publishers
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American Academy of Pediatrics Subcommittee on Practice Guidelines for Management of Head Trauma

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Principal Investigator, Microcomputer Applications in Clinical Medical Education, Apple Education Foundation
Principal Investigator, Cerebral Blood Flow and Metabolism During CPR after Asphyxia, American Heart Association
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Journal Referee, *Annals of Emergency Medicine, Prehospital and Disaster Medicine, Health Services Research*
Conference Chair, Emergency Department Surveillance: A Forum to Examine the Issues and Explore a National Strategy

ORGANIZATIONS/APPOINTMENTS

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PAST RELATED ACTIVITIES

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Co-Director and Medical Consultant, Warren County Ambulance Service
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National Association of Emergency Medical Technicians
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PAST RELATED ACTIVITIES

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ORGANIZATIONS/APPOINTMENTS

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Working with states to link crash to EMS, hospital and other injury data to determine the medical and financial consequences of specific vehicle, crash, and occupant characteristics.
Liaison to ASTM, NAHDO, and other organizations interested in the linkage and usefulness of state data.

PAST RELATED ACTIVITIES

Assisted development of Maine's statewide EMS data system
Research director on EMS effectiveness for trauma, cardiac, and psychiatric emergencies treated in the emergency department
Developed and directed Maine's pilot test and demonstration of the Sensitivity Index

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Department of Health and Human Services, HRSA Ad Hoc Committee Member--Model Trauma Care System Plan for USA
American College of Surgeons Committee on Trauma Ex Officio Member

PAST RELATED ACTIVITIES

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US Army--Casualty Management Planning--Dessert Storm Bronze Star Award

ORGANIZATIONS/APPOINTMENTS

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APPENDIX F

FINAL REPORT

UNIFORM PRE-HOSPITAL EMERGENCY MEDICAL SERVICES (EMS) DATA ELEMENT CONSENSUS DEVELOPMENT CONFERENCE

CONSENSUS STATEMENT

AND

UNIFORM PRE-HOSPITAL DATA ELEMENT DEFINITIONS

CONTENTS

UNIFORM PRE-HOSPITAL EMS DATA CONFERENCE

CONSENSUS STATEMENT

Introduction

The purpose of the Uniform Pre-Hospital EMS Data Conference was to develop a national consensus statement regarding EMS pre-hospital data elements and definitions. The Conference was conducted according to methods developed by the Office of Medical Applications of Research of the National Institutes of Health, published in *Guidelines for the Selection and Management of Consensus Development Conferences*. This document is the final Consensus Statement of the Conference Panel.

There have been numerous calls for data collection on EMS systems. Still, difficult impediments remain to the collection of a comprehensive set of data elements which will answer important questions about EMS. These difficulties include the fact that data exist in several disparate locations, such as in pre-hospital agency records, emergency departments, inpatient hospital records, and in vital statistics records. Linkage of records between these data sources is jeopardized when data are not computerized and the data owners are reluctant to collaborate. Comprehensive information about EMS has also been complicated enormously by lack of definition of a uniform set of data elements, thus preventing aggregation of data between agencies, regions, or states.

Emergency medical services (EMS) are an important part of the health care system, and include injury prevention, pre-hospital field care, emergency department care, inpatient and outpatient medical care, and rehabilitative care. The importance of EMS was brought to national attention in the mid-1960s with the publication in 1966 of *Accidental Death and Disability: The Neglected Disease of Modern Society*. The Highway Safety Act of 1966 created the National Highway Traffic Safety Administration (NHTSA) within the Department of Transportation to deal with highway safety issues. This legislation led to development of EMS guidelines and curricula as well as grants to fund state EMS development as components of their highway safety programs. From 1973 to 1981, the 1973 Emergency Medical Services Systems (EMSS) Act provided considerable Federal support for the development of EMS systems including the collection of uniform pre-hospital EMS data. In 1984, the Health Services, Preventive Health Services, and Home and Community Based Services Act was passed, from which developed the Emergency Medical Services for Children (EMS-C) Program. Passage of the Trauma Care Systems Planning and Development Act of 1990 focused on the need for collection of data for the evaluation of emergency medical care for life threatening and serious injury. Most recently, the Institute of

Medicine in 1993, published *Emergency Medical Services for Children,* a scholarly evaluation of the current national state of EMS-C. This report recommended that states collect and analyze uniform EMS data needed for planning, evaluation and research of EMS for children.

Several other important reports have emphasized the importance of injury and emergency illness as a component of our national health care system. Representative reports include *Injury Prevention: Meeting the Challenge, Cost of Injury in the United States: A Report to Congress 1989, and Emergency Medical Services for Children: A Report to the Nation.* The scope of the problem is enormous. In 1985, approximately 57 million persons were injured (Rice, 1989). The National Highway Traffic Safety Administration estimates that motor vehicle accidents cost the national economy in excess of $137 *billion* per year, kills approximately 40,000 individuals per year, and result in direct medical expenditures of approximately $40 billion per year.

How do EMS systems impact the morbidity, mortality, and costs to our nation from trauma, injuries, and emergency illness? This is a difficult question, because many aspects of medical care and access to medical care have shifted during the past 30 years. For instance, surgical, medical, cardiac, and pediatric intensive care units have evolved tremendously, are staffed differently, and have different available technology today than in the mid-1960s. Our pre-hospital personnel have many technological advantages over their predecessors, and our communities have communications technology to promote more rapid and presumably more effective responses. Emergency rooms, previously staffed by volunteer medical staff or medical trainees, are now full emergency departments with full time emergency medical physicians. Given this evolution on broad fronts, it is difficult to assess the specific efficacy of many components of our EMS systems. This is becoming increasingly important, because there are real constraints on health care expenditures by our nation. As an integral part of the national health care system, EMS is being subjected to appropriate, critical review. The question which must loom over us is simple. How well does the EMS system perform, and is this performance worth its cost?

Purposes of EMS Data Collection

The purpose of EMS data collection is to enable system managers to develop information to evaluate and improve access to emergency medical care for individuals with severe injuries or illnesses so as to reduce morbidity, mortality, and their impact on the fiscal, emotional, and social aspects of our society. In order to accomplish this, it is necessary to understand several issues with respect to EMS data.

First, what are the existing resources in the system? How many ambulances, trained emergency medical technicians (EMTs), paramedics, emergency departments, and hospitals participate in the system? What is the level of training of individuals involved in the system? What is the equipment carried by an ambulance? How many new ambulances should be purchased next year? How many paramedics does an agency need? What curricular materials need to be developed, and to fit into what voids of knowledge? What level of training is needed? For whom? What are the funding resources for the system?

Second, what is the pattern of use of the system? Who are the persons who utilize the system? How many infants, children, adolescents, adults, and elderly are treated in the system? How many individuals are seen with acute myocardial infarction? How many children are treated for bronchiolitis? Where do these persons live? How should the public be educated about the use of the EMS system?

Third, what does the system do? What medications or procedures are provided in the pre-hospital setting? What is the usage rate of these medications or procedures? Are they provided in a correct, safe manner? How is the provision of advanced life support guided by medical direction? Is medical direction even necessary? For what types of patients is the system designed? How does this compare with the answers to questions raised earlier concerning who actually uses the system?

Fourth, knowing what the system can do, does the system do it well? How long does it take for the ambulance to be notified of an incident? How long does it take for the crew to assemble and leave for the scene? How long are the crew members at the scene, and how quickly does a patient reach definitive medical care? Does this differ for adults and children, because of the need for specialty facilities? How long does it take for a response unit to be available for emergency response after an incident?

Fifth, does the system work? Is the mortality of patients who encounter the EMS system lower than patients to whom such a system is unavailable? Is morbidity reduced by well functioning EMS systems? Do "field saves" actually live to be discharged from the hospital? What is the effect of advanced pre-hospital capability on inpatient length of stay, hospital costs and charges, and the need for long term chronic care? What is the satisfaction of patients who encounter the EMS system? What new skills are needed for pre-hospital responders? How can we continuously improve the performance of the system? Does the EMS system provide feedback to the community about prevention?

In addition to the issues which affect the operations of individual EMS systems, there are public health issues which

require longitudinal information. For instance, what happens to the pattern of EMS use following a public education effort? Does the frequency of motor vehicle related EMS transports decrease following a concerted public education effort aimed at increasing safety device use, or following a stringent effort by law enforcement officers to enforce safety device use laws? Or does the frequency remain relatively unchanged but involve transport of less seriously injured patients? Are any of the preventive health expenditures at local, state, or national level effective at altering the epidemiology of injury and emergency illness in our society?

Finally, there are important research questions which need to be addressed. What is the effectiveness of epinephrine administration to cardiac arrest victims in the pre-hospital setting? Should albuterol be administered to asthmatic children by pre-hospital crews? What is the effect of pre-hospital administration of thrombolytic agents on the mortality of patients with acute chest pain? Questions such as these will rarely be approachable using a generalized data collection effort. Such questions will almost always require a careful research design, with detailed data collection concerning the relevant factors involved in the specific question. However, a well functioning general EMS data collection and management information system may be useful in formulation of relevant research questions of this type.

Purposes of the Uniform EMS Data Element Definitions

The Consensus Panel has restricted its focus to information directly related to events occurring beyond the dispatch process and prior to the emergency department care of a patient. Thus, many data elements which are important for an EMS information management system are not included in the data element definitions. The primary purpose of the Uniform EMS Data Element Definitions is to provide a common definition for data elements within the restricted focus of the pre-hospital time-frame, so that data elements will be able to be linked and analyzed with other data elements which are obtained from the dispatch centers, emergency departments, and other health facilities. In the context of a fully linked set of data files, an effective EMS information management system can then be devised.

The Consensus Panel has not attempted to construct a model ambulance run record or trip report. The data elements which are necessary for a properly documented ambulance run, fire department response, or other EMS patient care record include numerous elements which are not discussed in the Consensus Statement or included in the Uniform EMS Data Element Definitions. The form and content of run records, trip reports, or patient care records must be determined at local levels,

reflecting the important differences between agencies, regions, and states.

Finally, it is not a purpose of the Consensus Panel to pose the Uniform EMS Data Element Definitions as a mandatory set of data elements for collection and computerization. Rather, it is the purpose of the Panel to provide a common language for a set of data elements which can contribute to meaningful EMS databases. It is important to note, however, that certain research questions cannot be answered without EMS data. If an agency, region, or state chooses not to collect EMS data, then it will be difficult to approach such research questions. It is anticipated that agencies and governmental institutions which collect and analyze EMS data will be in better positions to compete for research funds to address such questions. It is also pointed out that certain legislation, such as the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), requires collection of data relevant to EMS systems, though not defining the precise data elements of such data. Other organizations are also encouraging and requiring collection of data related to emergency medical care, including the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). Regardless of the actions of this Consensus Panel, it is likely that the need for EMS data collection will increase in the future, whether based on economic pressures or on regulatory efforts.

Pediatric Issues Related to EMS Data Collection

The Institute of Medicine report *Emergency Medical Services for Children* contains an extensive discussion concerning the need for data collection to evaluate the care of children in EMS systems. The issues concerning children are diverse, and the needs of children differ from those of adults. The Consensus Panel recognizes these important differences, and has tried to incorporate the recommendations within the Institute of Medicine report into the uniform EMS data element definitions. For example, new data elements were introduced and incorporated into the data set to evaluate the respiratory effort and skin perfusion of pediatric patients.

It is certain that there are other data elements which are important to obtain in order to properly evaluate the care delivered to infants and children by our EMS systems. It is also likely, in the opinion of the Consensus Panel, that many data elements suggested for children may be of use in assessing the care rendered to adult patients. It is hoped that the proposed uniform EMS data element definitions addresses the needs of infants and children sufficiently well that the data dictionary can be implemented soon, without the necessity of separately attempting to define an EMS-C uniform data set. By combining pediatric and adult requirements into a single uniform data set,

the possibility of implementing an effective EMS data collection and management information system is increased.

Data Element Priority Definitions

The data elements that have been listed in this Consensus Statement represent some of the information components that are important in the ongoing evaluation of emergency medical services systems. All the data elements that appear in this Consensus Statement are valuable from a variety of perspectives. Other data elements may also be of critical value for inclusion in a comprehensive EMS management information system. This list of data element definitions should not be construed as complete or exclusive in any manner.

Data elements may be divided several ways. Data elements may be of critical importance to the clinical care of the patient, and those data elements may be an integral part of the patient care record (PCR). -Examples of such data elements are medications administered, with dosage and route of administration. Other data elements may be of crucial importance for evaluation of the EMS system, such as times of dispatch and outcome. Other data elements are useful for specific types of research or for answering specific epidemiological questions. For instance, certain data elements are useful to answer specific questions about out-of-hospital cardiac arrest. Finally, some data elements are fundamental data items that are not only crucial for local operations, but also useful to serve broad regional and national purposes. For example, knowledge of the birth dates of all EMS patients for a year would provide national, statewide, and regional information about the numbers of pediatric patients involved in EMS responses. Such information could guide the construction of pre-hospital curricular materials, as well as provision of specialized pediatric equipment.

The Consensus Panel has categorized each data element as essential or desirable. An essential data element is an element that is crucial for the basic operations of an EMS service and that can serve a purpose at regional and/or national levels. The Consensus Panel emphasizes that its characterization of a data element as essential should not imply that the collection of that data element is mandatory. Other elements, marked as desirable, may well be critical to local or regional operations, but may not be considered critical in all jurisdictions or situations. For instance, it is almost certainly crucial that EMS providers collect information for billing purposes, or their sources of funding will evaporate. It is crucial to mark certain items on a PCR for clinical purposes, but the detailed information that is necessary at that level may not be useful on a broader basis.

The Panel also recognizes, as it marks data elements essential or

desirable, that a uniform EMS data set is an evolutionary data set. Many data items have been denoted as desirable because the Panel recognizes the need to phase in certain data elements on a feasible timetable. Thus, the Panel envisions that the data set will be reevaluated within several years for reconsideration of data definitions, and for consideration of other data elements that may become useful on a regional or national level. Other elements, currently marked essential, may have failed to demonstrate value at a regional or national level, and would subsequently be classified as desirable, or even be deleted. The proposed uniform data set consists of 81 data elements, of which 49 have been characterized as "essential".

Beyond the data elements that are marked by the Consensus Panel as essential, it is important for states, regions, and individual provider agencies to review all the data elements contained in this Consensus Statement, and to evaluate the usefulness of the additional, desirable data elements. It is also important that additional data elements be considered for inclusion, based on the importance of such data elements to the local providers. In no manner is this Consensus Statement meant to constrict or restrict the choices for inclusion of data elements in a provider database system. Rather, the Consensus Statement is intended to provide a definition of a minimum, essential data set, and attempt to provide uniform definitions of additional desirable data elements. The Panel also notes that many types of data are best collected by EMS responders because these providers witness events and have access to information not available to later healthcare providers, such as in the hospital setting. EMS responders are also a source of some data elements that are essential for developing and evaluating prevention measures, e.g., the use of occupant restraints or protective gear.

The Panel believes that as EMS data systems are developed and implemented over the next several years, essential data elements should be included in those systems. If essential data elements are collected in all EMS data collection efforts, then aggregation of data at regional, state, and national levels will be feasible and will provide population based data about EMS systems. More complete systems, which include all the essential data elements, all the desirable data elements, and numerous additional valid data elements not discussed in this document, will be capable of answering more difficult questions with better precision and validity.

Improving Data Quality

Establishing a uniform set of definitions for the data elements in an EMS management information system does not fully address the difficulties that have been encountered with the quality of data obtained in such systems. The quality of data relates to

validity, reliability, and accuracy of data which are entered into the systems.

The validity of a data element is the degree to which an element actually measures or captures what it is intended to capture. For instance, there is no validity to asking whether an Alaskan Native American is Hispanic or non-Hispanic. An improperly defined data element concerning race and ethnicity could permit invalid data entry. Similarly, it should not be possible to denote a patient as a pregnant male. Providers differ in their authority to make some outcome judgments, e.g., to declare a patient expired. In the absence of record linkage, such differences in authority could lead to erroneous outcome conclusions.

The reliability of a data element reflects the degree to which a data element will be consistently interpreted. For instance, if the same provider evaluates the same set of patient data in a different manner every time data is entered, that data will not be reliable. Reliability does not denote that the measure is valid or accurate, but it does denote that the data element will be entered in a specific and reproducible manner.

The accuracy of a data element reflects the degree to which the element is accurately measured and accurately entered into the data system. For example, the accuracy with which age is entered into the database will relate to the estimating ability of the provider, the possibility that he or she requested birth date information and calculated the age correctly, and also will relate to whether the keypuncher missed and entered the wrong value.

Each of these measures of data quality needs to be carefully addressed, but all of them relate to the understanding by the providers of data that the data are important. When pre-hospital providers understand why a specific data element is important, there will be improved reliability and accuracy. When data base designers understand the specific purpose of a data element, the validity of the data element will be improved. When data is collected without apparent purpose or reason, data quality will deteriorate.

The Consensus Panel emphasizes that all EMS data systems must meticulously adhere to the following recommendations. By devoting proper attention to these issues, the quality of data which are obtained from pre-hospital personnel will improve, and satisfaction with the data collection process will increase.

1. Any agency, region, state or national entity that collects data from providers must provide feedback to the source of the data. Such feedback should include

constructive feedback about the quality of data submission, but more importantly, reports should be provided that will convey helpful information about system performance. For instance, an ambulance agency should receive statistical and descriptive information about their transported patients, the region's comparable statistics, the statewide statistics, and national statistics. Feedback must not be restricted to "rejected" data sheets, but must include reports which are genuinely useful to our EMS personnel who provide the data.

2. When data are utilized for a research or epidemiologic purpose, whether by university based academic researchers or state health department injury programs, it is imperative that feedback about such research be provided to the EMS personnel and agencies who provide the data used. It will be of high interest to EMS personnel and agencies to know about useful results of their data collection efforts, which represent large personal and economic investments.

3. There must be a single point of contact to receive comments and feedback about the uniform EMS data set that is defined in this Consensus Statement. The purpose is to receive comments, negative and positive, about the data set as it is implemented over the next several years. Comments could include interesting reporting formats, critical review of existing data elements, and suggestions about additional data elements. In the future, the uniform EMS data set should be revised in accordance with received comments, using a consensus process similar to that used in this conference.

4. There should be a similar single point of contact within agencies, regions, and states to receive comments and feedback about all elements of a database within those entities. In this manner, administrators of data collection systems can be aware of problems with the database, potential difficulties with specific data elements, and can increase their responsiveness to the pre-hospital providers. In addition, comments received at this level about data elements not contained in the uniform "national" data set may be helpful in the evolution of the uniform EMS data set that is defined in this Consensus Statement.

Linkage Issues and Outcome Measures

t is imperative that the uniform EMS data set be viewed in the

context of linkage to other EMS incident-related reports, including crash reports, emergency department records, and inpatient facility records. Without this context, the uniform EMS data set definitions fail to provide an adequate assessment of the entire spectrum of EMS systems. Data elements are needed from dispatch centers, emergency departments, crash records, motor vehicle registration and driver records, hospital inpatient and rehabilitation records, vital statistics files, and other sources.

It is expensive to create an EMS management information system using a separate data collection of all the relevant data into a new data file. By linking data which are maintained by the individuals who most care about those data, economies can be realized. For example, if the dispatch center records all the times concerning an EMS run automatically, then the EMS pre-hospital providers should not be required to write down those same times. Instead, the times should be obtained by linking the trip report information with the automatically acquired information at the dispatch center. In order for this to work, however, the dispatch center and the responder agency must be willing to cooperate with each other and provide the required data.

Technically, linkage of records which exist in two different computer database files is always a probabilistic technique. Even when conducted by hand, the EMS data expert evaluates the two records and makes a decision about whether the records refer to the same incident and the same individual. This process has been computerized effectively and probabilistic linkage software is currently available. For example, software has been made available to all states by the National Association of Governor's Highway Safety Representatives (NAGHSR) for linking crash and EMS files, using probabilistic methods. By collaborating with the owners of crash records and other injury data, EMS systems can obtain access to the data needed for linkage.

The Consensus Panel emphasizes that dispatch centers, emergency departments, hospitals, rehabilitation facilities, and other health care providers must understand the importance of providing data to administrators of EMS systems. Meaningful outcome measures are difficult or impossible to define within the time frame of the EMS record, but those outcome measures are extremely important to the pre-hospital provider. As the health care system is reformed in the next several years, linked EMS databases will be of value to these same dispatch centers, emergency facilities, and hospitals. Only with cooperation and linkage of data will these institutions and EMS systems be able to evaluate outcome, which will become the ultimate yardstick by which resources are allocated.

What is outcome? What is the proper time to assess outcome? What are valid measures of outcome? These are but a few of the difficult questions concerning the evaluation of outcome from EMS activities. The uniform EMS data set does not include specific fields concerning outcome, but the Consensus Panel expects that the EMS data elements will be evaluated in the context of linked data to provide answers concerning outcome questions.

Outcome may be assessed in terms of mortality, morbidity, dollars spent, hospital days, or by many other means. Mortality is an objective and readily available measure of outcome, but represents a small fraction of EMS incidents. Morbidity is difficult to assess in the absence of severity or acuity information as well as detailed medical information from hospital records. This is the primary reason that injury related data elements have been defined in a manner that permits more detailed assessment of specific injuries of specific body areas as well as vital signs and neurological indicators. By using these data elements from the uniform EMS data set, investigators can better stratify patients by their initial acuity.

The timing of outcome assessment is crucial, but this is not a simple matter. For instance, it may seem appropriate to assess outcome (dead or alive, for instance) at the time of arrival in the emergency department. However, such an outcome is not particularly meaningful if the patient then dies in the emergency department or in the intensive care unit. Assessment within 30 days may be appropriate, but at a societal resource assessment level, this assessment will be meaningless if the patient dies within 2 months. Thus, it is very important that the purpose of a specific outcome evaluation be understood, and that appropriate data are collected within the context of that purpose.

Some important outcome measures are mortality and morbidity. However, it is important to also consider the economic outcome of EMS incidents and interventions, because our nation is facing an increasingly tight financial constraint on expenditures for healthcare. It is important to consider the dollars spent on direct and indirect medical expenses, as well as dollars lost because of lost productivity, lives lost, etc. Investigators who are interested in evaluating the economic costs of EMS should refer to *Cost of Injury: A Report to Congress 1989* for detailed methodologic discussions.

Following is the list of the uniform prehospital EMS data element definitions resulting from this Conference. These definitions represent the consensus of the Conference Panel following discussion in both public and executive sessions.

UNIFORM PRE-HOSPITAL EMS DATA ELEMENT DEFINITION FORMAT

Each data element is presented in the format illustrated below, which is derived from *Federal Information Processing Standard (FIPS) Publication 28, Standardization of Data Elements and Representations.*

The Consensus Panel considered it important to provide sufficient detail about each data element to justify its inclusion in the uniform data set, as well as to assist agencies which seek to implement a data collection system. When a data element requires specific categories, these are listed as **Data Items**. If descriptions are required for the **Data Items**, these are listed in the **Technical Comments** for the particular definition. The Panel recognizes that the lists which are included in these definitions are imperfect, but the contents of these lists have been debated for many years without resolution. The lists included here are intended as a starting point for a uniform EMS data set which will evolve.

(Item NumberTag Number)

Name of Data Element:	Name
Priority:	Essential or desirable
Definition:	Short definition of data element.
Code:	A coded description of the data element values or attributes.
Data Items:	Defined data elements - alternative descriptions of the data element values or attributes.

Content: Detailed discussion of definition and content.

Discussion and Justification: Provide further details and justify the data element.

Technical Comments: Additional information which may be of use to individuals setting up a data collection system, including descriptions of **Data Items**, if needed.

The following types of characters are used to represent or "encode" data element values or attributes and Data Items.

A - Alphabetic (A through Z)
N - Numeric (0 through 9)
AN - Alphanumeric (Alphabetic and Numeric)

Unless otherwise stated, numeric data are right-justified with leading zeros, and field lengths are fixed. Unless stated specifically in the particular data element definition, as for example in the definitions for Glascow Coma Score components, Alphabetic and numeric codes have no ordinal or arithmetic significance.

The Consensus Panel considered it important that data elements and data item coding corresponding to established and widely used medical informatics coding (such as E Codes) be used, where applicable, for pre-hospital EMS data element definitions.

Guidance on coding to permit regional or statewide aggregation of computerized data via computerized data transfer between computers is not within the scope of this document. Such guidance is contained in ASTM E 1238-91 *Standard Specification for Transferring Clinical Observations Between Independent Computer Systems.*

Uniform Pre-hospital EMS Data Element Definitions

1.

Name of Data Element:	Incident Address
Priority:	Essential
Definition:	Address (or best approximation) where patient was found, or, if no patient, address to which unit responded.
Code:	Free text entry, or "unknown".

Content: Contains the street address or rural delivery number, followed by the apartment number or internal building number.

Discussion and Justification: Provides location of incident, which can be used to determine the appropriate level of EMS resources for specific areas.

Technical Comments: Use route numbers and mileposts, or other landmarks which can be coded in a consistent manner if a street address is not applicable. In maritime areas and in rural and wilderness areas, consideration should be given to use of geographic information system (GIS) coordinates or geographic positioning system (GPS) coordinates corresponding to the location of the incident site.

2.

Name of Data Element:	Incident City
Priority:	Essential
Definition:	City or township (if applicable) where patient was found or to which unit responded (or best approximation).
Code:	5 character numeric entry.
Data Items:	
{5 digit FIPS code}	
88888	Not applicable
99999	Unknown

Content: It is recommended that this field be coded using the FIPS system, wherein each city is encoded as a 5 digit number (i.e. Salt Lake City is coded as '93010'.) City FIPS codes are unique only within a state; for unique identification of a city within the United States, the two-character state code must precede the city code (i.e Salt Lake City, Utah is coded as 4993010 or UT93010). If the state code is used in combination with the city code, then coding should be 7 character numeric or 7 character alphanumeric.

Discussion and Justification: Provides city location of incident, which can be used to determine the appropriate level of EMS resources for specific areas. In addition, this field may facilitate probabilistic linkage to crash reports from the same city, or to hospitals within the same city. Field may be used for local city reports, permitting local understanding of the impact of EMS.

3.

Name of Data Element:	Incident County
Priority:	Essential
Definition:	County or parish (if applicable) where patient was found or to which unit responded (or best approximation).
Code:	3 character numeric entry.
Data Items:	
{3 digit FIPS code} 888 Not applicable 999 Unknown	

Content: It is recommended that this field be coded using the FIPS system, wherein the county is coded as a 3 digit number (i.e. Salt Lake County is coded as '035'.) The FIPS code uniquely identifies a county only within its state. For unique identification of a county within the United States, the code of the State must precede the county code. If the state code is used in combination with the county code then the coding should be 5 character numeric or 5 character alphanumeric. For example for Salt Lake County Utah, the coding should be either 49035 or UT035.

Discussion and Justification: Provides county location of incident, which can be used to determine the appropriate level of EMS resources for specific areas. In addition, this field may facilitate probabilistic linkage to crash reports from the same county, or to hospitals within the same county. Field may be used for local county reports, permitting local understanding of the impact of EMS. Can link data file with census data to determine effects of population density, socioeconomic information, etc. on need for EMS and evaluations of EMS outcome.

4.

Name of Data Element:	Incident State
Priority:	Essential
Definition:	State, territory, or province, or District of Columbia, where patient was found or to which unit responded.
Code:	2 character alphabetic or numeric entry.
Data Items:	
{2 digit FIPS code} 88 Not applicable 99 Unknown	

Content: It is recommended that this field be coded using the FIPS system, or by using the standard 2 character abbreviations for states.

Discussion and Justification: Provides a means of aggregating EMS incidents by state, which allows reports to state legislatures concerning statewide EMS activities. Can be used to assess statewide resource requirements for EMS operations. Important where patients are transported across State lines.

Technical Comments: FIPS codes exist for outlying areas of the United States including Freely Associated States, and the Trust Territory, as well as for individual minor outlying island territories.

5.

Name of Data Element:	Location Type
Priority:	Essential
Definition:	Type of location of incident.
Code:	4 character alphanumeric entry

Data Items

849.0 Home / Residence	849.6 Public building
849.1 Farm	849.7 Residential institution
849.2 Mine or quarry	849.E Educational institution
849.3 Industrial place and premises	849.8 Other specified location
849.4 Place for recreation or sport	849.9 Unspecified location
849.5 Street or highway	849.U Unknown

Content: Location type data items are coded in terms of the (ICD-9) E849 place of occurrence codes. This location refers to the location where the injury occurred, not necessarily the origin of the transport.

Discussion and Justification: Location type of the incident is important for epidemiologists as well as EMS planners deciding where to allocate EMS resources. The categories in this dictionary are from ICD-9 and are E849 place of occurrence codes, with the exceptions that a category for educational institutions has been added, and an unknown category is provided. The unknown category is provided so that inaccurate data is not entered into this field. This field is always applicable.

Technical Comments: It is expected that these codes will need to be modified when ICD-10 becomes widely used. Definitions below are from ICD-9, which is currently utilized. It is suggested that those who implement EMS database systems use the E Code (for those categories which have an E Code) for reporting and exporting purposes. The decimal point is not exported and this is a 4 character field.

(E 849.0) Home / Residence

Includes apartment, boarding house, farm house, home premises, residential house, non-institutional place of residence, private driveway, private garage, private garden, private home, private walkway, swimming pool within private house or garden, and yard of home. Excludes home under construction but not occupied, or institutional place of residence.

(E 849.1) Farm

Includes farm buildings and land under cultivation. Excludes farm house and home premises of farm.

(E 849.2) Mine or quarry

Includes gravel pit, sand pit, or tunnel under construction.

(E 849.3) Industrial place and premises

Includes building under construction, dockyard, dry dock, factory building or premises, garage (place of work), industrial yard, loading platform in factory or store, industrial plant, railway yard, shop (place of work), warehouse, and workhouse.

(E 849.4) Place for recreation or sport

Includes amusement park, baseball field, basketball court, beach resort, cricket ground, football field, golf course, gymnasium, hockey field, holiday camps, ice palace, lake resort, mountain resort, playgrounds including school playground, public parks, racecourses, resorts of all types, riding school, rifle range, seashore resorts, skating rink, ski resorts, sports ground, sports palace, stadium, public swimming pool, tennis court, vacation resort. Excludes occurrences in private house, private garden, private swimming pool, or private yard.

(E 849.5) Street or highway
Includes all public roadways.

(E 849.6) Public building
Includes any building used by the general public, including airport, bank, cafe, casino, church, cinema, clubhouse, courthouse, dance hall, parking garage, hotel, market, movie theater, music hall, nightclub, office, office building, opera house, post office, public hall, broadcasting station, restaurant, state, public, and private schools, commercial shop, bus or railway station, store, or theater. Excludes home garage or industrial building or workplace. Also excludes state, public, and private schools, which varies from the ICD-9 definition (see Educational institution, below).

(E 849.7) Residential institution
Children's home, dormitory, hospital, jail, home for elderly, orphanage, prison, reform school.

(849.E) Educational institution
Includes state, public, and private schools. Excludes playground, gymnasium, and other recreationsl locations within educational institutions, which should be coded as place for recreation or sport. While this is included in the official E coding for public building, it is identified here as an additional code so as to more readily identify accidents that occur in an educational setting.

(E 849.8) Other specified location
Includes beaches, canal, caravan site, derelict house, desert, dock, forest, harbor, hill, lake, mountain, parking lot, parking place, pond or natural pool, prairie, railway line, reservoir, river, sea, seashore, stream, swamp, trailer court, and woods. Excludes resorts.

(E 849.9) Unspecified location
Includes any location not included in the above classification.

(849.U)) Unknown
To be used when the location of incident is not known.

6.

Name of Data Element:	Onset Date
Priority:	Desirable
Definition:	Date of onset of symptoms or injury date.
Code:	8 character numeric entry, coded as YYYYMMDD.

Content: Format permits sorting across multiple years, and is recommended for data export purposes. Century digits are mandatory.

Discussion and Justification: This date may differ from the date of the EMS response, and was considered important to provide linkages to other data files such as crash files, and to provide information concerning how long it takes individual patients or families to obtain prehospital care. For example, if a crash occurs and 3 days later the patient decides he isn't feeling better, he may call EMS at that point. Another example is the patient who calls EMS with chest pain that has been present for 3 weeks.

Technical Comments: Format YYYYMMDD is recommended as part of FIPS standard. If YYYY is unknown, it should be coded as 9999; if MM is unknown it should be coded as 99; if DD is unknown it should be coded as 99. For month and day, use leading zeros if necessary to pad the fields to 2 characters each.

7.

Name of Data Element:	Onset Time
Priority:	Desirable
Definition:	Time of onset of symptoms or injury time.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Useful for linkage to injury files, and useful for same reasons as the onset date. It is recognized that this information may be difficult to obtain from prehospital providers. In combination with the Onset Date, this time is used as the start time for calculating the "EMS notification time"; notification time is used to determine the adequacy of communications for timely reporting by the public of medical emergencies in a given area.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

8.

Name of Data Element:	Date Incident Reported
Priority:	Essential
Definition:	Date the call is first received by a public safety answering point (PSAP) or other designated entity.
Code:	8 character numeric entry, coded as YYYYMMDD.

Content: Format permits sorting across multiple years, and is recommended for data export purposes. Century digits are mandatory.

Discussion and Justification: Used in conjunction with "Time Incident Reported" to assess the duration between onset of a medical emergency and receipt of a request for EMS response, as well as to assess the duration of time required to mobilize the response and provide the patient definitive care. The data element is also used to help EMS planners allocate resources by day of week and season of year.

Technical Comments: Format YYYYMMDD is recommended as part of FIPS standard. If YYYY is unknown, it should be coded as 9999; if MM is unknown it should be coded as 99; if DD is unknown it should be coded as 99. For month and day, use leading zeros if necessary to pad the fields to 2 characters each.

9.

Name of Data Element:	Time Incident Reported
Priority:	Essential
Definition:	Time call is first received by Public Safety Answering Point (PSAP) or other designated entity.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59. When available, the time should be the connect time to the PSAP.

Discussion and Justification: Provides the start point of the EMS response, and allows managers to assess the adequacy of EMS response, identify delays, and plan resources in a manner to provide expeditious EMS response.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

10.

Name of Data Element:	Time Dispatch Notified
Priority:	Essential
Definition:	Time of first connection with EMS dispatch.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Provides the start point of the dispatch component of the EMS response. This data element allows managers to assess delays between the time of incident report and the notification of EMS dispatchers.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

11.

Name of Data Element:	Date Unit Notified
Priority:	Desirable
Definition:	Date response unit is notified by EMS dispatch.
Code:	8 character numeric entry, coded as YYYYMMDD.

Content: Format permits sorting across multiple years, and is recommended for data export purposes. Century digits are mandatory.

Discussion and Justification: Permits planning of EMS resources by day of week or season of year. Also permits assessment of EMS responsivity. The data element is labeled as desirable because it is recognized that this is almost always the same date as the date incident was reported. The data element will be of use particularly when the incident is reported immediately prior to midnight, and the response unit is notified after midnight.

Technical Comments: Format YYYYMMDD is recommended as part of FIPS standard. If YYYY is unknown, it should be coded as 9999; if MM is unknown it should be coded as 99; if DD is unknown it should be coded as 99. For month and day, use leading zeros if necessary to pad the fields to 2 characters each.

12.

Name of Data Element:	Time Unit Notified
Priority:	Essential
Definition:	Time response unit is notified by EMS dispatch.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Permits measurement of the actual responder response or delays. Assists planning of communication resources for individual responders, and allows identification of system delays following the dispatch component of the EMS system.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

13.

Name of Data Element:	Time Unit Responding
Priority:	Essential
Definition:	Time that the response unit begins physical motion.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Permits measurement of delay between notification of EMS responder and the actual mobilization of the response unit. This data element refers to physical motion of the responding EMS vehicle, and does not refer to individual EMTs who may respond directly to the scene when notified by individual radio or telephone. For example, if an EMS incident is reported, one EMT may be at home or work and be responsible to go to the station which holds the ambulance. Another EMT may be notified and may drive in a private vehicle directly to the scene. The data element entered should be the time that the ambulance actually leaves the station, not the time at which the other EMT drives to the scene in the private vehicle.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

14.

Name of Data Element:	Time of Arrival at Scene
Priority:	Essential
Definition:	Time EMS unit stops physical motion at scene (last place that the unit or vehicle stops prior to assessing the patient).
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Permits measurement of the time required for the response vehicle to go from the station to the scene. This data element refers to the physical motion of the responding EMS vehicle. If an individual EMT arrives at the scene by private vehicle, that is NOT the value to be entered in this field. Otherwise, system delays in having an equipped vehicle at the scene will fail to be identified.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

15.

Name of Data Element:	Time of Arrival at Patient
Priority:	Desirable
Definition:	Time response personnel establish direct contact with patient.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: • Desirable in certain situations in which there may be a significant delay between the time at which a response unit arrives at the scene and the time at which the personnel can access the patient. For example, if the EMTs are prevented because of fire or adverse conditions from approaching the patient, this time will be useful. Search and rescue operations will also note delays between arrival at the overall scene and the actual patient contact.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

16.

Name of Data Element:	Time Unit Left Scene
Priority:	Essential
Definition:	Time when the response unit began physical motion from scene.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Permits calculation of scene time by subtracting the time of arrival at scene from the time unit left scene.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

17.

Name of Data Element:	Time of Arrival at Destination
Priority:	Essential
Definition:	Time when patient arrives at destination or transfer point.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Permits calculation of the time required to go from the scene to the destination of the response unit. If the patient is transferred from one EMS responder vehicle to another, then the time of arrival at destination for the first responder is the time of arrival or patient contact (or both) for the second agency.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

18.

Name of Data Element:	Time Back in Service
Priority:	Essential
Definition:	Time response unit back in service and available for response.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Allows planning of EMS resources. Permits assessment of the delay between arrival at destination and availability of the response unit.

Technical Comments: Format HHMM is recommended as part of FIPS standard. There should be no colon in the field when used for export purposes. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

19.

Name of Data Element:	Lights and Sirens to Scene
Priority:	Essential
Definition:	The use of lights and sirens enroute to scene.
Code:	1 character numeric entry.

Data Items:

1	Non-emergent, no lights or sirens
2	Initial emergent, downgraded to no lights or sirens
3	Initial non-emergent, upgraded to lights or sirens
4	Emergent, with lights or sirens
8	Not applicable

Discussion and Justification: To allow system administrators to know the frequency with which responder vehicles are using lights and sirens. Such usage carries explicit risks and EMS managers are responsible to assure that lights and sirens are used appropriately.

20.

Name of Data Element:	Service Type
Priority:	Essential
Definition:	Type of service requested.
Code:	1 character numeric entry.
	Data Items:
1	Scene
2	Unscheduled interfacility transfer
3	Scheduled interfacility transfer
4	Standby
5	Rendezvous
8	Not applicable
9	Unknown

Discussion and Justification : Used to categorize the types of service which are required, and allows planning of EMS resource allocation.

1 Scene

Refers to direct response to scene of incident or injury, such as roadway, etc. This location should be the location indicated in Data Elements 1-5 in this document. This code should not be used by the second unit which receives the transfer of a patient from another EMS responder prior to arrival at a medical facility or final destination which is coded as a rendezvous.

2 Unscheduled Interfacility Transfer

Refers to transfers of patients from one facility to another facility. For example, if a patient is stabilized in an emergency department and then transpored to a tertiary care facility, this is the correct code. This code should not be used for planned, scheduled transfers, which are coded separately. This code should not used by the second unit involved in the transfer of a patient from one EMS responder to another EMS responder during an unscheduled interfacility transfer, which is coded as a rendezvous.

3 Scheduled Transfer

Refers to transfers of patients from one facility to another facility, as defined above for *interfacility*. However, this code is chosen only when the transfer is scheduled in advance, such as a planned morning transfer of a patient from one hospital to another.

4 Standby

Refers to situation in which EMS response unit is requested to arrive at a scene and be available, such as at a football stadium. If an incident occurs during the *standby*, the service requested becomes *scene*. Thus, this code should only be used when no patient event actually occurs.

5 Rendezvous

Refers to situation in which a second EMS unit receives transfer of patient from first EMS unit before arrival at a medical facility. Can be used when two units meet to complete the initial scene response or during an unscheduled interfacility transfer.

8 Not Applicable

Use this code when there is no patient at the scene. This differs from standby, which is scheduled.

9 Unknown

Use this code when there is not enough information on the run sheet to determine the correct response for this data element.

21.

Name of Data Element:	Incident Number
Priority:	Essential
Definition:	Unique number for each incident reported to dispatch.
Code:	Numeric entry. Number of characters optional.

Content: The number of characters used for coding should be uniform throughout a state or region. Code missing values in a consistent manner.

Discussion and Justification: This number should be unique, if possible, within a state or region. If this is not possible, it must be unique within an agency, and then by combining it with a unique agency number, it will be possible to construct a unique identifying number for the incident.

This number is valuable for linking EMS data files with other files related to the incident, such as emergency department and inpatient hospital files, if those medical files also contain this number. Accurate numbering within all available files may be facilitated by technologies such as bar codes.

Probabilistic linkage methodology is of great value when linking files that do not have numeric fields such as incident number in common. However, linkage is greatly facilitated by the presence of such a number in each of the files to be linked.

22.

Name of Data Element:	Response Number
Priority:	Essential
Definition:	Unique number for each individual response by a response unit to an incident.
Code:	Numeric entry. Number of characters optional.

Content: Code missing values in a consistent manner. The number of characters should be determined by the response unit's agency.

Discussion and Justification: This is the unique number within an individual response unit's records that identifies its runs. This number should be unique for an incident within a single EMS response unit. Useful for linking to other health files. Same purposes as incident number.

Technical Comments: In some cases incident number, patient care number, or response number may be the same. In other instances, this response number may be a component of the incident number. For example, an incident number might be constructed from a responder license number combined with the response number.

23.

Name of Data Element:	Patient Care Record Number
Priority:	Essential
Definition:	Unique number for each patient care record (PCR).
Code:	Numeric entry. Number of characters optional.

Content: Code missing values in a consistent manner. The number of characters should be determined by the appropriate state or regional authority.

Discussion and Justification: Unique number for a patient care record. Ideally, this number should be unique within a state or region. If unique within a state, this number could also be the incident number and response number. Provides a specific key to a specific record. This record number, if unique within a state or region of interest, will fulfill all the requirements for linkage which have been described under incident number.

Technical Comments: In some cases incident number, patient care record number, or response number may be the same.

This is the central and most important number in the prehospital portion of the EMS information system. Every incident must have a PCR number even if there is no patient. An incident will have multiple PCRs if there are multiple patients or multiple responders to single patients.

24.

Name of Data Element:	Agency / Unit Number
Priority:	Essential
Definition:	Number that identifies the agency and unit responding to an incident.
Code:	Numeric or alphanumeric entry.

Content: This element consists of the agency identifier (letter/s or number/s, and the unit number. Code missing values in a consistent manner.

Discussion and Justification: Identifies specific agency and unit number. Can be used to construct reports which are specific to agencies or units. Particularly valuable for local reporting. This number may also be of value in the automatic construction of PCR numbers or incident numbers.

Technical Comments: Must be unique within largest region of interest. For instance, if it is desired to generate statewide reports broken out by agency, then the number must be unique within the state.

25.

Name of Data Element:	Vehicle Type
Priority:	Essential
Definition:	Type of vehicle which responded to incident.
Code:	1 character numeric entry.
	Data Items:
	1 Ground
	2 Rotor craft
	3 Fixed wing
	4 Other
	5 None

Discussion and Justification: Allows EMS managers and planners to break out EMS responses by the major categories of responding vehicles. While there are clearly numerous other possible vehicles, such as water craft, skis, sleds, etc., the categories provided here are the major vehicle types which will be of interest at regional and state levels.

For individual data systems in which there is more specific interest in other vehicles, additional categories may certainly be added. For purposes of exporting data to a common dataset, these additional categories should be collapsed into the category *Other*.

26.

Name of Data Element:	Crew Member One Number
Priority:	Essential
Definition:	Personnel certification / license number for first crew member.
Code:	Alphanumeric entry.

Discussion and Justification: Necessary to identify specific crew members participating in an EMS response. Useful for constructing experience reports, monitoring care rendered by specific providers, planning educational programs.

Technical Comments: Should be unique within the region of interest. If not applicable, code in a consistent manner.

27.

Name of Data Element:	Crew Member Two Number
Priority:	Essential
Definition:	Personnel certification / license number for second crew member.
Code:	Alphanumeric entry.

Discussion and Justification: Necessary to identify specific crew members participating in an EMS response. Useful for constructing experience reports, monitoring care rendered by specific providers, planning educational programs.

Technical Comments: Should be unique within the region of interest. If not applicable, code in a consistent manner.

28.

Name of Data Element:	Crew Member Three Number
Priority:	Desirable
Definition:	Personnel certification / license number for third crew member.
Code:	Alphanumeric entry.

Discussion and Justification: Necessary to identify specific crew members participating in an EMS response. Useful for constructing experience reports, monitoring care rendered by specific providers, planning educational programs.

This data element is labeled as desirable while the data elements referring to the first 2 crew

members are labeled as essential. This is because the crew members should be listed in order of skill level and involvement, and it has been the experience of most data collection efforts in EMS that most incident records list 2 crew members. There is no intent to discourage data managers to list as many additional crew members as desired.

Technical Comments: Should be unique within the region of interest. If not applicable, code in a consistent manner.

29.

Name of Data Element:	Crew Member One Type
Priority:	Essential
Definition:	Personnel certification / license level of crew member.
Code:	1 character numeric entry.

Data Items:

1	First responder	5	Nurse
2	EMT basic	6	Physician
3	EMT intermediate	7	Other health care professional
4	EMT paramedic	8	None of the above
		9	Unknown

Discussion and Justification: This data element permits assessing the level of care which was available on the EMS responder team. By combining this information with vehicle type, there is maximum flexibility in describing the type of service which was provided. For instance, any level of crew member certification may be present with any type of vehicle.

Reports of value may include descriptions of therapies according to level of provider, adherence to protocols which are written differently for various levels of provider, etc.

30.

Name of Data Element:	Crew Member Two Type
Priority:	Essential
Definition:	Personnel certification / license level of crew member.
Code:	1 character numeric entry.

Data Items:

1	First responder	5	Nurse
2	EMT basic	6	Physician
3	EMT intermediate	7	Other health care professional
4	EMT paramedic	8	None of the above
		9	Unknown

Discussion and Justification: This data element permits assessing the level of care which was available on the EMS responder team. By combining this information with vehicle type, there is maximum flexibility in describing the type of service which was provided. For instance, any level of crew member certification may be present with any type of vehicle.

Reports of value may include descriptions of therapies according to level of provider, adherence to protocols which are written differently for various levels of provider, etc.

31.

Name of Data Element:	Crew Member Three Type
Priority:	Desirable
Definition:	Personnel certification / license level of crew member.
Code:	1 character numeric entry.

Data Items:

1	First responder	5	Nurse
2	EMT basic	6	Physician
3	EMT intermediate	7	Other health care professional
4	EMT påramedic	8	None of the above
		9	Unknown

Discussion and Justification: This data element permits assessing the level of care which was available on the EMS responder team. By combining this information with vehicle type, there is maximum flexibility in describing the type of service which was provided. For instance, any level of crew member certification may be present with any type of vehicle.

Reports of value may include descriptions of therapies according to level of provider, adherence to protocols which are written differently for various levels of provider, etc.

32.

Name of Data Element:	Patient Name
Priority:	Essential
Definition:	Patient name.
Code:	Free text entry, "not applicable" or "unknown".

Content: "Not applicable" is used when there is no patient, such as when the responding team cannot find the patient, or when the responding team is on standby.

Discussion and Justification: Essential because of its value in probabilistic linkage, both as a linking variable as well as a confirmatory variable to determine appropriate linkage. It is recognized that this data element requires careful protection from misuse, but it is more appropriate to regulate appropriate use of this field rather than to prevent its collection.

Technical Comments: If coded in a single field, then the format should be LAST, FIRST, MIDDLE INITIAL with only one space after the comma between the last and first names, and between first name and initial. An alternative approach is to separate the data element into three fields, one each for the last and first names, and middle initial.

33.

Name of Data Element:	Patient Street Address
Priority:	Desirable
Definition:	Patient's street address.
Code:	Free text entry, "not applicable", "unknown" or "none".

Discussion and Justification: Useful for determining the political entity responsible for potential public health interventions, payment for services, etc..

34.

Name of Data Element:	City of Residence
Priority:	Desirable
Definition:	Patient city or township of residence (if applicable).
Code:	5 character numeric entry.
Data Items: {5 digit FIPS code} 88888 Not applicable 99999 Unknown	

Content: It is recommended that this field be coded using the FIPS system, wherein the city is encoded as a 5 digit number (i.e. Salt Lake City is coded as '93010'). City FIPS codes are only unique within a state; for unique identification of a city within the United States, the two-character State code must precede the city code (i.e. Salt Lake City, Utah is coded as 4993010 or UT93010). If the state code is used in combination with the city code, then coding should be 7 character numeric or 7 character alphanumeric.

Discussion and Justification: Useful for determining the political entity responsible for potential public health interventions, payment for services, etc.

35.

Name of Data Element:	County of Residence
Priority:	Desirable
Definition:	County or parish where patient resides (if applicable).
Code:	Numeric entry.
Data Items: {3 digit FIPS code} 888 Not applicable 999 Unknown	

Content: It is recommended that this field be coded using the FIPS system, wherein the county is encoded as a 3 digit number(i.e. Salt Lake County is coded as '035'). The FIPS code uniquely identifies a county only within its state. For unique identification of a county within the United States, the code of the state must precede the county code. If a state code is used in combination with the county code, then the coding should be 5 character numeric or 5 character alphanumeric. For example for Salt Lake County Utah, the coding should be either 49035 or UT035.

Discussion and Justification: Useful for determining the political entity responsible for potential public health interventions, payment for services, etc.

36.

Name of Data Element:	State of Residence
Priority:	Desirable
Definition:	State, territory, or province, or District of Columbia, where patient resides.
Code:	2 character numeric entry.
Data Items: {2 digit FIPS code} 88 Not applicable 99 Unknown	

Content: It is recommended that this field be coded using the FIPS system, or by using standard abbreviations.

Discussion and Justification: Provides a means of aggregating EMS incidents by state, which allows reports to state officials concerning statewide EMS activities. Can be used to assess statewide resource requirements for EMS operations.

Technical Comments: FIPS provides codes for outlying areas of the United States, Freely Associated States, and the Trust Territory, as well as for individual minor outlying island territories.

37.

Name of Data Element:	Zip Code of Residence
Priority:	Essential
Definition:	Zip code of patient's residence.
Code:	5 character numeric entry.
Data Items: {5 digit ZIP code} 88888 Not applicable 99999 Unknown	

Content: Code as 5 character numeric entry.

Discussion and Justification: Useful for determining the political entity responsible for potential public health interventions, payment for services, etc. County could be derived in software from Zip Code of Residence.

38.

Name of Data Element:	Telephone Number
Priority:	Desirable
Definition:	Patient's primary telephone number.
Code:	10 character numeric entry.
Data Items:	
{10 digit telephone number} 8888888888 Not applicable 9999999999 Unknown	

Content: Coded as 10 numeric entry.

Discussion and Justification: Permits followup with patient and facilitates billing.

39.

Name of Data Element:	Social Security Number
Priority:	Desirable
Definition:	Patient Social Security number.
Code:	9 character numeric entry.
Data Items:	
{9 digit SSN} 888888888 Not applicable 999999999 Unknown	

Content: Code as 9 character numeric entry.

Discussion and Justification: Could provide valuable linkage data element. However, this field is very difficult for field responders to obtain.

Unknown should be coded when the responder does not know the Social Security number, while not applicable is coded when there is no patient or when the patient is known to not have one. If EMS responder fails to ask, code as unknown.

Technical Comments: May be particularly valuable in jurisdictions where driver licenses or other forms of identification have bar coded Social Security numbers.

40.

Name of Data Element:	Date of Birth
Priority:	Essential
Definition:	Patient's date of birth.
Code:	8 character numeric entry, coded as YYYYMMDD.

Content: Format permits sorting across multiple years, and is recommended for data export purposes. Century digits are mandatory.

Discussion and Justificat : Extremely valuable for probabilistic linkage and calculation of accurate age information. Provides much more discriminatory power in probabilistic linkage than the numeric age.

Technical Comments: Format YYYYMMDD is recommended as part of FIPS standard. If YYYY is unknown, it should be coded as 9999; if MM is unknown it should be coded as 99; if DD is unknown it should be coded as 99. For month and day, use leading zeros if necessary to pad the fields to 2 characters each.

41.

Name of Data Element:	Age
Priority:	Desirable
Definition:	Patient's age or best approximation.
Code:	3 character numeric entry.
	Data Items: {3 numerals for age in years} 888 Not applicable 999 Unknown 000 For patients up to 1 year of age

Content: Coded as 3 character field. Numbers are always right-justified. Use leading zeroes when necessary.

Discussion and Justification: Valuable in the absence of a date of birth. When date of birth is available this data element should be calculated by the computer. Age information permits linkage to other files, and is useful for epidemiologists interested in patterns of emergency medical problems in different age groups.

42.

Name of Data Element:	Gender
Priority:	Essential
Definition:	Gender of patient.
Code:	1 character alphabetic entry.

Data Items:

M	Male
F	Female
U	Unknown

Discussion and Justification: Valuable for linkage to other files, and permits reporting of epidemiologic information by gender.

Technical Comments: This field should be coded as M, F, or U.

43.

Name of Data Element:	Race / Ethnicity
Priority:	Essential
Definition:	Patient's ethnic origin.
Code:	2 character numeric entry.

Data Items:

01	White, non-Hispanic	05	American Indian/Alaska Native
02	White, Hispanic	06	Asian/Pacific Islander
03	Black, non-Hispanic	07	Other
04	Black, Hispanic	88	Not Applicable
		99	Unknown

Discussion and Justification: Useful for epidemiologic studies, and of importance to data systems in order to access certain types of Federal or state funds which are directed to specific ethnic groups.

Technical Comments: Data Items selected in accordance with Office of Management and Budget Directive 15.

44.

Name of Data Element:	Destination / Transferred to
Priority:	Essential
Definition:	Health care facility or prehospital unit/home that received patient from EMS responder providing this record.
Code:	1 character numeric entry.

Data Items:

1	Home	5	Other EMS responder (air)
2	Police/jail	6	Hospital
3	Medical office/clinic	7	Morgue
4	Other EMS responder (ground)	8	Not applicable

Discussion and Justification: Allows reporting by destination facilities, and allows linking when a patient is transferred between EMS responder agencies. Not applicable would be selected when there is no patient.

It is anticipated that each region or state will codify its list of hospitals in an internally consistent manner, permitting reports by facility. For purposes of the uniform data set, the first 8 categories have been defined above. For purposes of export to a larger data set, such as a national data set, all hospital destinations would be collapsed down into a single code for *Hospital.*

This data element is very valuable for probabilistic linkage. For instance, when an EMS responder indicates a specific hospital identifier, this can greatly facilitate linkage to outpatient and inpatient facility records.

45.

Name of Data Element:	Destination Determination
Priority:	Essential
Definition:	Reason a transport destination was selected.
Code:	2 character numeric entry.

Data Items:

01	Closest facility (none below)	06	Protocol
02	Patient/family choice	07	Specialty resource center
03	Patient physician choice	08	On-line medical direction
04	Managed care	09	Diversion
05	Law enforcement choice	10	Other
		88	Not applicable
		99	Unknown

Discussion and Justification: Helps EMS managers to determine whether the choice of destination is appropriate. Items which are defined as patient, physician, or family choice are of interest to determine whether a trauma or referral system is functioning well, or is frequently overridden by non-medical issues.

Technical Comments: Only 1 choice should be selected.

46.

Name of Data Element:	Lights and/or Sirens Used from Scene
Priority:	Essential
Definition:	Use of lights and/or sirens from the scene.
Code:	1 character numeric entry.

Data Items:

1	Non-emergent, no lights or sirens
2	Initial emergent, downgraded to no lights or sirens
3	Initial non-emergent, upgraded to lights or sirens
4	Emergent, with lights or sirens
8	Not applicable

Discussion and Justification: Allows system administrators to know the frequency with which responder vehicles are using lights and sirens. Such usage carries explicit risks and EMS managers are responsible to assure that lights and sirens are used appropriately.

47.

Name of Data Element:	Incident / Patient Disposition
Priority:	Essential
Definition:	End result of EMS response.
Code:	2 character numeric entry.

Data Items:

01	Treated, transported by EMS	06	Patient refused care
02	Treated, transferred care	07	Dead at scene
03	Treated, transported by private vehicle	08	Cancelled
		88	Not applicable
04	Treated and released	99	Unknown
05	No treatment required	00	No patient found

Discussion and Justification: Allows reports to be generated according to the final disposition of EMS responses. This will provide information about the reasons for which EMS is notified, correlated with the ultimate incident disposition. For instance, it will be of value to know that in certain regions, EMS is frequently activated to see patients who require no treatment nor transport. Reports generated from this data element may be of use in coordinating the dispatch and responder functions as well.

Technical Comments:

01 Treated and transported by EMS

This code means that the EMS responder providing the data record treated and transported the patient. Transport may be to any valid destination, as defined for the destination data element. If the EMS responder transports a patient to a rendezvous point with another EMS responder (for instance, a ground crew rendezvous with a helicopter based agency), this is the correct code for this data element.

02 Treated, transferred care

This code means that the EMS responder provided treatment at the scene but the patient was transferred into the care of another service. The EMS responder did not provide transport in this instance. For example, if a BLS provider is at a scene and treats a patient, but a separate ALS responder arrives and takes over, the BLS record would indicate this code. If an EMS responder treats a patient who is then transported by a separate police or fire vehicle, this is the correct code for the EMS responder record.

03 Treated, transported by private vehicle

This code means that the EMS responder provided treatment, but the patient was transported to his or her destination by a private vehicle. This includes instances in which the patient transports himself via private automobile, if the EMS responder understands that the patient is going to seek further medical care, such as at a private doctor's office or the local emergency department.

04 Treated and released

This code means that the EMS responder provided treatment, and the patient required no further emergency care. This is distinct from the instance in which the patient is known to be in need of further care, but is transported by himself or others to the facility providing further care

05 No treatment required

This code means that the EMS responder evaluated the patient, and no treatment was required. If the patient refused evaluation, or if the EMS responder did not evaluate a specific patient, this is not the correct code for this data element.

06 Patient refused care

Patient was at scene and refused care, whether injured or not. If the EMS responder knows that there is an injury, but the patient refuses care and is transported by friends or acquaintances, this is still the correct code for this data element.

07 Dead at scene

This code means that the patient was pronounced dead at the scene, whether or not treatment was undertaken. If a patient is given CPR at the scene and transported to the hospital while undergoing CPR, then this is not the correct code. If a patient is given CPR and is then pronounced dead at the scene, this is the correct code.

88 Cancelled

This code means that the EMS response was cancelled enroute or on scene.

99 Not applicable

This code is used when a disposition is not applicable. For instance, if the unit is on standby and no incident occurs, then this data element is not applicable. In this instance, the data element call "Service Type" will have been coded as standby. For all standby records, this data element should be coded as not applicable.

00 No patient found

If not cancelled, but no patient can be found by the responder, this is the correct code.

48.

Name of Data Element:	Chief Complaint
Priority:	Desirable
Definition:	Statement of problem by patient or other person.
Code:	Free text entry, "not applicable" or "unknown".

Content: Use "unknown" when this information cannot be obtained (for instance, a comatose patient without witnesses). If there is no patient, such as in a standby call, this should be coded as not applicable.

Discussion and Justification: May be useful, particularly with sophisticated text searching algorithms, for analysis of certain types of EMS incidents. Difficulties of categorization and interpretation were the primary reasons for labeling this item as desirable rather than essential.

May be of use in correlating the perception of patients who utilize the EMS system with the objective outcome of the run. This information could be of use in directing public educational efforts concerning health or EMS use.

Technical Comments: If the element is collected, then it is important to consistently code unknown and not applicable when the chief complaint is not known or not present.

49.

Name of Data Element:	Cause of Injury
Priority:	Essential
Definition:	External cause of injury.
Code:	5 character alphanumeric entry.

Data Items:

81x.x	Motor vehicle traffic accident
814.x	Pedestrian traffic accident
82x.x	Motor vehicle non-traffic accident
826.x	Bicycle accident
83x.x	Water transport accident
84x.x	Aircraft related accident
85x.x	Accidental drug poisoning
86x.x	Accidental chemical poisoning
88x.x	Accidental falls
890.x-	Fire and flames
890.2	Smoke inhalation
900.x	Excessive heat
901.x	Excessive cold
905.x	Venomous stings (plants, animals)
906.x	Animal bites
907.x	Lightning
910.x	Drowning
913.x	Mechanical suffocation
919.x	Machinery accidents
925.x	Electrocution (non-lightning)
926.x	Radiation exposure
955.x	Firearm self inflicted (intentional)
960.1	Rape
965.x	Firearm assault
966.x	Stabbing assault
967.x	Child assaults
985.x	Firearm injury (accidental)
000.7	Other
000.8	Not applicable
000.9	Unknown

Discussion and Justification: It is necessary to have a broad taxonomy for defining the external causes of injury, and this data element is coded according to the E codes in ICD-9. It is not the intent to suggest use of complete E code numbers in the field; it is recognized that the entire E code list is too cumbersome for field use. The element may be collapsed into the categories which have been listed above. When needed, the E code should be defined in as much detail as is present in the E code definitions. Such codes will always be

collapsible to the categories defined here, but the detail will provide additional value to injury prevention researchers.

It has been traditional to attempt to assign a single E code to individual incidents. Multiple entries, however, aid in gathering better detail about injuries, and to eliminate confusion when the EMS provider must choose between two reasonable E codes.

In the course of arriving at the above consensus on the definition of Cause of Injury, there was discussion but no Panel consensus on the use of a smaller set of Data Items shown below:

Motor vehicle occupant	Pedestrian
Motorcycle rider	Bicycle
Fall	Burn
Near-drowning	Poisoning
Cutting or piercing	Struck by/against person or object
Other	

Technical Comments: This data element is based on E codes, but the coding structure is intended to be more flexible. Additional code numbers have been added for "not applicable" and "unknown", so that this data element can always be filled in. The data item list is described below, for the suggested E code categories. When the code number includes lower case x's, this means that the item includes all E codes which have the initial part of the code. For example, motor vehicle traffic accident is coded as E81x.x, and would include any E code from E810.0 through E819.9. In instances where further detail is not available, the data element should be filled in with x's to fill out the length of the field. Thus, the field width should always be 5 characters in length (the decimal point is omitted).

It is understood that information needed to define the fourth digit may rarely be available to the pre-hospital provider. However, the data element is defined in terms of 4 characters so that when agencies are able to provide all the detail possible within the E code taxonomy, it is possible to do so. The uniform standard should be collapsibility to the categories listed in this document.

If agencies, regions, or states wish to collect additional specific field values for this data element, they should adhere to the E code listing in ICD-9.

E81x.x Motor vehicle traffic accident

This includes any motor vehicle accident occurring on a public roadway or highway. Third digit identifies other vehicle type or object involved. Fourth digit identifies injured person. For example, 813.6 defines a motor vehicle/bicycle accident in which the bicyclist was injured.

E814.x Pedestrian traffic accident

Motor vehicle accidents in which the patient was a pedestrian struck by a motor vehicle of any type. Includes individuals on skates, in baby carriages, in wheelchairs, on skateboards, skiers, etc.

E82x.x Motor vehicle non-traffic accident

This includes any motor vehicle accident occurring entirely off public roadways or highways. For instance, an accident involving an all terrain vehicle (ATV) in an off-road location would be a non-traffic accident.

E826.x Bicycle accident

Includes any pedal cycle accident. Pedal cycle is defined to include bicycles, tricycles, and excludes any motorized cycles. Does not include motor vehicle/bicycle accidents. See above comment on E81x.x

E83x.x Water transport accident

Includes all accidents related to watercraft. Excludes drowning and submersion accidents unless they are related to watercraft use. Thus, if a person falls out of a boat and drowns, it should be coded within this category. If a person drowns in a swimming pool or bathtub, it should be coded as E910.x (see below).

E84x.x Aircraft related accident

Includes spacecraft.

E85x.x Accidental drug poisoning

Includes accidental poisoning by drugs, medicinal substances, or biological products. Extensive codes are available if an agency wishes to collect specific information.

E86x.x Accidental chemical poisoning

Includes accidental poisoning by solid or liquid substances, gases, and vapors, which are not included under accidental drug poisoning.

E88x.x Accidental falls

Excludes falls which occur in the context of other external causes of injury, such as fires, falling off boats, or falling in accidents involving machinery.

E89x.x Fire and flames

Includes burning by fire, asphyxia or poisoning from conflagration or ignition, and fires secondary to explosions. Excludes injuries related to machinery in operation, vehicle accidents, and arson. The numeric code includes a third digit which indicates the site of the fire and a fourth digit indicating injurious conditions accompanying fire such as explosions, fumes, smoke, etc.

E89x.2 Smoke inhalation

Includes smoke and fume inhalation from conflagration. The numeric code includes an option to indicate the site of the fire (3rd digit). The fourth digit "2" indicates the injurious

agent, "smoke and fumes". For example E890.2 indicates inhalation injuries from a fire in a private dwelling.

E900.x Excessive heat

Includes thermal injuries related to weather or heat produced by man, such as in a boiler room or factory. Excludes heat injury from conflagration.

E901.x Excessive cold

Includes cold injury due to weather exposure, or cold produced by man, such as in a freezer.

E905.x Venomous stings (plants, animals)

Includes bites and stings from venomous snakes, lizards, spiders, scorpions, insects, marine life, or plants.

E906.x Animal bites

Includes animal bites, including non-venomous snakes and lizards. Subcodes are available to include dog, cat, rat, and other specific bites.

E907.x Lightning

Excludes falling of an object secondary to lightning, and also excludes injuries from fire secondary to lightning.

E910.x Drowning

Accidental drowning not related to watercraft use. Includes swimming accidents, bathtubs, etc.

E913.x Mechanical suffocation

Includes suffocation in bed or cradle (crib death), closed space suffocation, plastic bag asphyxia, accidental hanging, etc.

E919.x Machinery accidents

Includes all machinery accidents except when machinery is not in operation. Excludes electrocution.

E925.x Electrocution (non-lightning)

Includes accidents related to electric current from exposed wire, faulty appliance, high voltage cable, live rail, or open electric socket. Excludes lightning, which is coded as E907.x.

E926.x Radiation exposure

Excludes complications of radiation therapy.

E955.x Firearm self inflicted (intentional)

These codes refer to firearm injuries, which are subcoded by the final digit into handguns (.0), shotguns (0.1), hunting rifle (0.2) and others. If the EMS responder knows that an

intentional assault was involved, or knows that the injury was intentionally self inflicted, then EMS provider will not be able to easily assess this issue, and then the code should be entered as accidental (E985.xthe E code should be entered to indicate this (E965.x or E955.x). In most instances, the).

E960.1 *Rape*

E965.x *Firearm assault*

E966.x *Stabbing assault*

Includes cuts, punctures, or stabs of any part of the body.

E967.x *Child assaults*

Includes all forms of child battering and non-accidental injury to children. The subcode indicates the perpetrator, and it is unlikely that the EMS responder will be able to provide this information. This code should be entered in all instances in which there is sufficient suspicion by the EMS responder that the responder would be required by law to report the case to authorities as a suspected case of child abuse.

E985.x *Firearm injury (accidental)*

000.7 *Other*

Use this code when no other category applies.

000.8 *Not applicable*

This code is not an official E code, and should be entered in any case where an external injury code is not applicable, such as when a patient suffers from chest pain or fever. In nearly all instances where an injury has occurred, this data element should be filled in with a valid E code, not a "not applicable" designation.

000.9 *Unknown*

This code is provided primarily for situations in which the data is being entered at a time when the information cannot be accurately reconstructed from the run record. This should be a rare entry.

50.

Name of Data Element:	Provider Impression
Priority:	Essential
Definition:	Provider's clinical impression which led to the management given to the patient (treatments, medications, procedures).
Code:	5 character numeric entry.
	Data Items:
789.00	Abdominal pain / problems
519.80	Airway obstruction
995.30	Allergic reaction
780.09	Altered level of consciousness
312.90	Behavioral / psychiatric disorder
427.50	Cardiac arrest
427.90	Cardiac rhythm disturbance
786.50	Chest pain / discomfort
250.90	Diabetic symptoms (hypoglycemia)
994.80	Electrocution
780.60	Hyperthermia
780.90	Hypothermia
785.59	Hypovolemia / shock
987.90	Inhalation injury (toxic gas)
798.99	Obvious death
977.90	Poisoning / drug ingestion
659.90	Pregnancy / OB delivery
799.10	Respiratory arrest
786.09	Respiratory distress
780.30	Seizure
959.90	Sexual assault / rape
987.90	Smoke inhalation
989.50	Stings / venomous bites
436.00	Stroke / CVA
780.20	Syncope / fainting
959.90	Traumatic injury
623.80	Vaginal hemorrhage
000.77	Other
000.88	Not applicable
000.99	Unknown

Discussion and Justification: This data element contains the single clinical assessment which primarily drove the actions of the EMS responder. It should be possible to determine whether the treatments or medications provided match protocols which relate to the clinical impression. When more than one choice is applicable to a patient, the responder should

indicate the single most important clinical assessment that drove most of the plan of therapy and management.

It is obvious that this list is incomplete. It is also recognized that different agencies, which have different assessment driven protocols, will wish to have lists corresponding to the authority of their own responders. The list above is provided to promote consistent coding of the identified items. Agencies are encouraged to add other categories, and provide their experience with the data element at the time of its next revision.

It should be noted that this coding system differs from current systems. For instance, many EMS data sets include the entity, Animal Bite. In the uniform data set, such an entry should be coded in this field as a Traumatic Injury. The site of injury should be indicated in the injury field described later in this dictionary, showing the type (laceration or puncture) and site of the bite itself. In addition, the Cause of Injury should be coded as E906.x as discussed under the data element, Cause of Injury. For another example, Sexual Assault is coded in this data element in the same manner as a Traumatic Injury, but the Cause of Injury would be coded as E960.1, and Injury Intent would be coded as intentional. The reason for using this approach is to avoid overlapping, duplicative codes which are not attached to a general taxonomy such as ICD-9. Such codes would become agency specific and would not be flexible enough to permit combining data from different agencies.

Technical Comments: The field width should always be 5 digits in length. Therefore, data items should be zero padded on the left to assure interpretability; the decimal point is not included in the data item coding. The list provided here is not all-inclusive, but the definitions are described in more detail below.

Abdominal pain / problems *789.00*

Includes acute abdomen, painful abdomen, cramps, etc. Does not include abdominal trauma.

Airway obstruction *519.80*

Includes choking, swelling of neck, croup, epiglottitis, foreign body in airway, etc.

Allergic reaction *995.30*

Includes reactions to drugs, plants, insects, etc. Category includes hives, urticaria, wheezing and so forth when suspected of being related to allergy.

Altered level of consciousness *780.09*

Refers to patients with any alteration of consciousness, including patients who appear to be substance abusers or under the influence of drugs or alcohol.

Behavioral / psychiatric disorder *312.90*

Includes all situations in which a behavioral or psychiatric problem was considered the major problem for the EMS responder.

Cardiac arrest *427.50*

All instances in which cardiac arrest occurred, and either death was pronounced immediately, or external cardiac massage was instituted.

Cardiac rhythm disturbance *427.90*

Includes any rhythm disturbance which was noted on physical examination or with a cardiac monitor, when the rhythm was the major clinical reason for care rendered by the EMS responder.

Chest pain / discomfort *786.50*

Includes patients with complaint of chest pain, including pain felt related to heart disease, upset stomach, or muscle pain in the chest wall. If an agency has different protocols for different types of chest pain, then this code should be separated out according to the types of protocols.

Diabetic symptoms (hypoglycemia) *250.90*

Relates to patients with symptoms relatable to diabetes, generally when there is a history of diabetes in the patient. The major symptom is hypoglycemia, but in circumstances where diabetes is known to exist, this category can include ketoacidosis, as well as other complications of diabetes.

Electrocution *994.80*

Instances of electrocution. Please note that the proper E code should be entered in the Cause of Injury data element.

Hyperthermia *780.60*

When hyperthermia is the major clinical assessment driving EMS responder care.

Hypothermia *780.90*

Usually relates to environmental hypothermia, such as following submersion in cold water, avalanches, or other environmental exposure situations.

Hypovolemia / shock *785.59*

Patients with clinical shock, usually felt to be hypovolemic. All patients considered to have shock by EMS responders should be coded with this code, as it is relatively difficult to identify other less common forms of shock outside the hospital setting.

Inhalation injury (toxic gas) *987.90*

Excludes smoke inhalation.

Obvious death *798.99*

Patients who were dead at the scene, in whom no therapy was undertaken.

Poisoning / drug ingestion *977.90*

Includes drug ingestions which are inappropriate drugs or overdoses, as well as poisonings

from chemicals. Toxic gases should be coded as inhalation injury (987.90). Venomous bites or stings should be coded as 989.50 (see below).

Pregnancy / OB delivery *659.90*

Includes all aspects of obstetric care rendered in the prehospital setting. This ICD code is the closest approximation for such a general category, and agencies may wish to break down this category more explicitly.

Respiratory arrest *799.10*

Instances in which the patient stops breathing. These patients always require ventilatory support on at least a temporary basis.

Respiratory distress *786.09*

Includes patients with respiratory distress who continue to have spontaneous breathing and never suffer respiratory arrest. These patients may require ventilatory support.

Seizure *780.30*

Includes major and minor motor seizures.

Sexual assault / rape *959.90*

Refers to suspected sexual assault / rape. The code refers to unspecified traumatic injury, but the Cause of Injury code should resolve this adequately.

Smoke inhalation *987.90*

Smoke inhalation encountered in conflagration setting. The Cause of Injury code should include the proper E code.

Stings / venomous bites *989.50*

Includes poisonous snakes, insects, bees, wasps, ants, etc. If an allergic reaction occurs and predominates the clinical situation, then the clinical assessment should be coded as an allergic reaction rather than a sting or bite, since the E code in the Cause of Injury data element will further clarify the cause.

Stroke / CVA *436.00*

Cerebrovascular accidents, strokes, TIA.

Syncope / fainting *780.20*

Fainting is the major clinical assessment, even though the patient may be fully awake at the time of EMS evaluation.

Traumatic injury *959.90*

All patients in whom traumatic injury is the major reason for the EMS action. Further details should be provided in the injury description matrix described later in this data dictionary.

Vaginal hemorrhage *623.80*

Refers to abnormal vaginal bleeding in sufficient amount to have driven the EMS response. When pregnancy is involved, vaginal hemorrhage should be coded when the hemorrhage itself was the major concern to the EMS responder. When childbirth or other obstetric issues are more important, then this data element should be coded as 659.90.

Other *000.77*

Use this code when no other categories apply.

Not applicable *000.88*

Use this code when there is no patient.

Unknown *000.99*

Use this code when there is not enough information on the run sheet to determine the clinical impression of the EMS responder. This should be a very rarely used code.

51.

Name of Data Element:	Pre-Existing Condition
Priority:	Essential
Definition:.	Pre-existing medical conditions known to the provider.
Code:	5 character alphanumeric entry.

Data Items:

493.90	Asthma	585.00	Chronic renal failure
250.00	Diabetes	239.90	Cancer
011.90	Tuberculosis	401.90	Hypertension
492.80	Emphysema	312.90	Psychiatric problems
518.81	Chronic respiratory failure	780.30	Seizure/convulsions
		V44.00	Tracheostomy

Discussion and Justification: . Pre-existing conditions may affect the protocols followed by EMS responders. The data element is intended to capture information as understood by EMS providers at the scene, not as defined later in the medical record of the hospital. Thus, if the EMS responder finds out that a patient has several pre-existing conditions after he or she arrives at the hospital, those conditions should not be coded in this data element. It is clear that the list provided here may not include other important conditions. Other conditions such as "402.00 - Hypertensive heart disease" should be added as desired, but it is hoped that the above conditions will be included in all data sets.

Technical Comments: Multiple entries should be possible. As with other multiple entry data elements, the preferable data base architecture is a properly designed relational file structure. Also, the coding should always be 5 characters in length; data items should be

zero padded on the left to assure interpretability. Data Item coding is taken from The International Classification of Diseasees ICD-9-CM manual. Data Items are limited to conditions that would significantly alter the approach of the EMS responder. The coding for "Tracheostomy" is alphanumeric and is taken from the ICD-9-CM listing of V Codes for "PERSONS WITH A CONDITION INFLUENCING THEIR HEALTH STATUS". This data element will clearly need refinement after there is more experience with its collection and interpretation.

52.

Name of Data Element:	Signs and Symptoms Present
Priority:	Essential
Definition:	Signs and symptoms reported to or observed by provider.
Code:	5 character numeric entry.

Data Items:

789.00	Abdominal pain	401.90	Hypertension
724.50	Back pain	780.90	Hypothermia
578.10	Bloody stools	787.00	Nausea
786.09	Breathing difficulty	344.90	Paralysis
427.50	Cardioresp. arrest	785.10	Palpitations
786.50	Chest pain	659.90	Pregnancy/childbirth/miscarriage
933.10	Choking	780.30	Seizures/convulsions
558.90	Diarrhea	780.20	Syncope
780.40	Dizziness	780.09	Unresponsive/unconscious
388.70	Ear pain	623.80	Vaginal bleeding
379.91	Eye pain	787.00	Vomiting
780.60	Fever/Hyperthermia	780.70	Weakness (malaise)
784.00	Headache		

Discussion and Justification: This data element is intended to capture the information provided to or obtained by the EMS responder in order to assess the patient. It is intended that these signs and symptoms be correlated with the clinical impression of the responder. This would help EMS managers plan educational programs for the responders.

It is obvious that the list of items provided here is incomplete. It is hoped that at least these items will be incorporated into data being collected, and after several years of experience with the data element, the listing should be appropriately refined. For this reason, ICD-9 codes with the decimal omitted, have been used for this data element.

Technical Comments: Multiple entries should be possible. As with other multiple entry data elements, the preferable data base architecture is a properly designed relational file structure.

53.

Name of Data Element:	Injury Description
Priority:	Essential
Definition:	Clinical description of injury type and body site.
Code:	3 character alphanumeric entry.

Data Items:

Body Sites		Injury Types	
A	External (including burns)	01	Amputation
B	Head only (excluding neck, cervical spine and ear)	02	Blunt injury
C	Face (including ear)	03	Burn
D	Neck	04	Crush
E	Thorax (excluding thoracic spine)	05	Dislocation/fracture
F	Abdomen (excluding lumbar spine)	06	Gunshot
G	Spine	07	Laceration
H	Upper extremities	08	Pain w/o swelling/bruising
I	Lower extremities or bony pelvis	09	Puncture/stab
J	Body region unspecified	10	Soft tissue swelling/bruising

Content: Intended to permit the detailed listing of all injuries sustained by a patient, coded according to injury type and body site of the injury. Multiple entries will be possible. Each injury should be designated by body site and injury type. The most severe five injuries should be recorded.

The body sites included as Data Items are consistent with body areas used to calculate the Injury Severity Score (ISS). This list is slightly expanded from the usual ISS, but is easily collapsed if necessary.

Discussion and Justification: This is a crucial data element which will enable EMS planners to know what types of injuries are incurred by patients using the EMS system. The data element will also be of value in assessing the correspondence between injury assessment in the field and actual injuries as evaluated in medical facilities. A major reason for using ISS related body sites is the ability to compare the hospital inpatient ISS areas with those indicated by the prehospital provider.

It is understood that various levels of providers will be permitted to make injury assessments at different levels of sophistication. For example, the diagnosis of fracture is considered out of scope for many prehospital responders. In this case, a term might be added for swelling, or some other marker by which an EMS responder is supposed to suspect a fracture or dislocation. It is stressed that this data element is supposed to reflect the clinical impression of injury by the EMS responder, not necessarily the final, correct medical diagnosis.

Technical Comments: There are at least 2 reasonable approaches to coding this data element. It is assumed for purposes of this discussion that up to 5 injuries should be entered.

First, body site could each be coded by letters from A to J and injury type could be coded by a 2 character numeric entry. Each entry into this data element could then be coded as a letter, and a number. This method has the advantage of conserving space on the run sheet, because only the two lists would be necessary.

Second, a matrix could be placed on the run sheet, and each intersection on the matrix could have an alphanumeric code. The provider would simply mark the intersections corresponding to each of the specific injuries, up to a maximum of five. This method has the disadvantage of requiring a larger amount of space on the run sheet, but offers the advantage of being more readily understood by the EMS responder.

To illustrate the matrix method, consider the following diagram.

Patient Injury Matrix		Amputation 01	Blunt 02	Burn 03	Crush 04	Dislocation/Fracture 05	Gunshot 06	Laceration 07	Pain 08	Puncture/Stab 09	Soft Tissue Swelling 10
External	A										
Head	B										
Face	C										
Neck	D										
Thorax	E		X				X				
Abdomen	F		X								
Spine	G										
Upper Ext	H	X									
Lower Ext / Pelvis	I				X						
Unspecified	J										

In this case, there has been an upper extremity amputation, blunt trauma to the chest and abdomen, a pelvic crush injury, and a gunshot wound to the chest (thorax).

54.

Name of Data Element:	Injury Intent
Priority:	Desirable
Definition:	Intent of individual inflicting injury.
Code:	**1 character numeric entry.**
Data Items:	
1	Intentional, self
2	Intentional, other
3	Unintentional
8	Not applicable
9	Unknown

Discussion and Justification: Intended to help injury surveillance specialists who are interested in homicide and suicides, inflicted child injuries, etc. The EMS provider may be in a unique situation to assess this issue which would then be of enormous value to the medical personnel caring for the patient. However, it is clear that the EMS provider will often not be able to assess this question.

Drug or alcohol abuse is impossible to code with this data element unless involved in a suicide attempt. For instance, if an EMS responder transports an intoxicated patient to a hospital with no other injuries, this data element would be coded as not applicable.

If the data element is collected, the EMS provider should indicate that an event is intentional if he or she has any suspicion of such. The data element is not intended to carry legal significance, but rather is intended to assist researchers in identifying possible cases of intentional injury for further study.

Technical Comments: If a firearm or stabbing is involved, this data element is redundant with proper coding of the external cause of injury, which permits coding for intentional injury on self or others.

55.

Name of Data Element:	Safety Equipment
Priority:	Essential
Definition:	Safety equipment in use by patient at time of injury.
Code:	2 character numeric entry.

Data Items:

01	None	12	Eye protection used
02	Shoulder belt only used	13	Protective clothing used
03	Lap belt only used	14	Personal flotation device used
04	Shoulder and lap belt used	15	Protective clothing/gear used
05	Child safety seat used	88	Not applicable
06	Helmet used	99	Unknown
07	Airbag deployed, no belt used		
08	Airbag deployed shoulder belt used		
09	Airbag deployed, lap belt used		
10	Airbag deployed, lap and shoulder belt used		
11	Airbag deployed, child safety seat used		

Discussion and Justification: Provides important information about safety device use in motor vehicle accidents, boating accidents, and industrial accidents with eye injuries. Data will be of use for corroboration of police reports concerning crashes.

If the EMS responder knows that no safety device was employed, then the data element should be coded as none. If none of the indicated devices was used, the element should also be coded as none. If the data element is not applicable, then this should be coded as such. Finally, if the EMS provider has no information about safety device use and cannot obtain such information from the patient or witnesses, then the data element should be coded as unknown.

56.

Name of Data Element:	Factors Affecting EMS Delivery of Care
Priority:	Desirable
Definition:	Special circumstances affecting the EMS response or delivery of care.
Code:	2 character numeric entry.

Data Items:

01	Adverse weather	06	Prolonged extrication (>20 min)
02	Adverse road conditions	07	Hazardous material
03	Vehicle problems	08	Crowd control
04	Unsafe scene	09	Other
05	Language barrier	88	Not applicable

Discussion and Justification: For systems planners who are evaluating response times, this data element provides explanations for delays encountered in the system. For instance, the time to scene would be expected to be prolonged if there was a blizzard, or if gunfire prevented EMS responders from patient access. If there was no problem with EMS delivery, this data element would be coded as not applicable.

The list provided is intentionally small, as it is expected that agencies that collect this data element will have very specific issues to address. Their data should, however, be collapsible to the above list.

Technical Comments: Unsafe scene includes presence of gunfire, instances in which police prevented access because of safety concerns, etc. Vehicle problems includes problems with the EMS responder vehicle itself, not with other vehicles which might have obstructed traffic.

Extrication has been moved into this data elements because extrication is not a patient treatment and relates less to the medical care of the patient than to the environment in which EMS responders must work.

57.

Name of Data Element:	Suspected Alcohol / Drug Use
Priority:	Essential
Definition:	Suspected alcohol or drug use by patient.
Code:	1 character numeric entry.
Data Items:	
1	Alcohol, yes
2	Drugs, yes
3	Alcohol/Drugs, yes
4	No
8	Not applicable
9	Unknown

Discussion and Justification: Important data element for injury research, permitting reports of value to public health researchers and policy makers.

Technical Comments: Should be coded as yes whenever the EMS responder suspects alcohol or drug use by the patient may have contributed to the incident. The use of drugs or alchohol in isolation have been coded individually for epidemiological purposes and specific use should be coded appropriately when possible. Not applicable should be used when there is no patient, such as in a standby response. If alcohol or drugs are totally unrelated to the incident, this field should be coded as no.

58.

Name of Data Element:	Time of First CPR
Priority:	Desirable
Definition:	Best estimate of time of first CPR.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Permits assessment of the duration of cardiopulmonary resuscitation prior to arrival of EMS responder. Useful for research purposes and for planning public education concerning CPR.

Technical Comments: Format HHMM is recommended as part of FIPS standard. No colon is used between HH and MM. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.
This data element is undefined if CPR was never administered. Thus, in writing computerized reports, a program should first examine the "Provider of First CPR" field, or a treatment field, to determine that CPR occurred on the run. If CPR was never rendered, this field should never be examined by the software.

59.

Name of Data Element:	Provider of First CPR
Priority:	Desirable
Definition:	Person who performed first CPR on patient.
Code:	1 character numeric entry.
Data Items:	
1	Bystander
2	EMS responder
8	Not applicable
9	Unknown

Discussion and Justification: Useful for assessing the quality of CPR rendered by initial responders to a cardiorespiratory arrest, for planning public educational efforts, etc.

Technical Comments: Not applicable should be used when there is no need for CPR given the condition of the patient. Unknown should only be used when data is being entered long after the actual incident and the information cannot be correctly reconstructed from the hardcopy record. For instance, unknown should never be the code if there was no CPR rendered; this should be coded as not applicable.

60.

Name of Data Element:	Time CPR Discontinued
Priority:	Desirable
Definition:	Time at which medical control or responding EMS unit terminated resuscitation efforts (chest compressions and CPR) in the field.
Code:	4 character numeric entry, coded as HHMM

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Provides information concerning the duration of CPR in the field in cases in which the patient was pronounced dead in the field.

Technical Comments: Format HHMM is recommended as part of FIPS standard. No colon is used between HH and MM. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

This data element is undefined if CPR was never administered (see Technical Comments for *Time of First CPR*)

61.

Name of Data Element:	Time of Witnessed Cardiac Arrest
Priority:	Desirable
Definition:	Time of witnessed cardiac arrest.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Allows assessment of actual total arrest time in patients with cardiac arrest. This information is valuable for researchers and educators concerned with CPR training.

Technical Comments: Format HHMM is recommended as part of FIPS standard. No colon is used between HH and MM. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

This data element is undefined if CPR was never administered. Thus, in writing computerized reports, a program should first examine the "Provider of First CPR" field, or a treatment field, to determine that CPR occurred on the run. If CPR was never rendered, this field should never be examined by the software.

62.

Name of Data Element:	Witness of Cardiac Arrest
Priority:	Desirable
Definition:	Person who witnessed the cardiac arrest.
Code:	1 character numeric entry
Data Items:	
1	Bystander
2	EMS responder
8	Not applicable
9	Unknown

Discussion and Justification: Provides information concerning the incidence of witnessed cardiac arrest prior to or during EMS responses.

Technical Comments: Not applicable should be used when there was no cardiac arrest or witness of a cardiac arrest. Unknown should only be used when data is being entered long after the actual incident and the information cannot be correctly reconstructed from the hardcopy record. For instance, unknown should never be the code if there was no cardiac arrest or witness; this should be coded as not applicable.

63.

Name of Data Element:	Time of First Defibrillatory Shock
Priority:	Desirable
Definition:	Time of first defibrillatory shock.
Code:	4 character numeric entry, coded as HHMM.

Content: HH ranges from 00 to 23; MM ranges from 00 to 59.

Discussion and Justification: Allows assessment of the time required between onset of cardiac arrest and provision of defibrillation in instances of ventricular fibrillation. Provides information about the rapidity with which the EMS responder correctly diagnoses the rhythm and takes action.

Technical Comments: Format HHMM is recommended as part of FIPS standard. No colon is used between HH and MM. Unknown values should be coded as 99 for HH or MM. Use leading zeros to assure 2 character field width for HH and MM. Midnight is coded as 0000, and begins the new day.

This data element is undefined if defibrillation was never administered. Thus, in writing computerized reports, a program should first examine a treatment / procedure field, to determine that defibrillation occurred on the run. If defibrillation was never rendered, this field should never be examined by the software.

64.

Name of Data Element:	Return of Spontaneous Circulation
Priority:	Desirable
Definition:	Whether a palpable pulse or blood pressure was restored following cardiac arrest and resuscitation in the field.
Code:	1 character numeric entry
Data Items:	
1	Yes
2	No
8	Not applicable

Discussion and Justification: Outcome of cardiac resuscitation in the field. If the patient remains in cardiac arrest throughout the incident and continues to receive CPR until reaching the emergency department, this data element should be coded as no, even if the patient was subsequently resuscitated in the emergency department.

Technical Comments: There should be no unknown value for this data element. If no cardiac arrest ever occurred, this data element is not applicable and should be coded as such.

65.

Name of Data Element:	Pulse Rate
Priority:	Essential
Definition:	Patient's palpated or auscultated pulse rate expressed in number per minute.
Code:	3 character numeric entry.

Data Items:

{pulse rate}
888 Not obtained
999 Unknown

Content: Code as 3 digit field.

Discussion and Justification: The pulse rate is a component of various triage scoring systems, and permits a rough assessment of the severity of illness of the patient. This data element is based on the physical examination of the patient, and the pulse must be palpated or auscultated. An electrical rhythm is not sufficient, as the patient could have electromechanical dissociation. In this instance, the correct value of this data element is 000

66.

Name of Data Element:	Initial Cardiac Rhythm
Priority:	Desirable
Definition:	Initial monitored cardiac rhythm as interpreted by EMS personnel.
Code:	2 character numeric entry

Data Items:

01	Sinus rhythm	06	Narrow complex tachycardia
02	Other rhythm from 60-100 (not otherwise listed)	07	Wide complex tachycardia
		08	Ventricular fibrillation
03	Paced rhythm	09	Asystole
04	Bradycardia	10	Pulseless electrical activity
05	Extrasystoles	88	Not applicable
		99	Unknown

Discussion and Justification: Provides the initial monitored rhythm, permitting reports generated according to initial rhythm. Such reports would be of use in assessing the survival rate after certain rhythms.

It is understood that some agencies collect data about cardiac rhythms with more detail than this list. For instance, many agencies expect EMS personnel to distinguish first, second, and third degree heart block. There is no intention to restrict the manner in which any agencies decide to code cardiac rhythms, but there is a necessity to be able to collapse those rhythms to a common definition which can then be combined. For the examples of heart block mentioned, those would all collapse into a wide or narrow complex tachycardia (if the rate is $>$ 100), other rhythm between 60 and 100, or bradycardia, if heart rate $<$ 60.

Technical Comments: This field should be coded as not applicable when the EMS responder is not an appropriate level provider to assess electrical rhythm, or if electrical monitoring is unavailable to the provider.

67.

Name of Data Element:	Rhythm at Destination
Priority:	Desirable
Definition:	Monitored cardiac rhythm upon arrival at destination.
Code:	2 character numeric entry.

Data Items:

01	Sinus rhythm	06	Narrow complex tachycardia
02	Other rhythm from 60-100 (not otherwise listed)	07	Wide complex tachycardia
		08	Ventricular fibrillation
03	Paced rhythm	09	Asystole
04	Bradycardia	10	Pulseless electrical activity
05	Extrasystoles	88	Not applicable
		99	Unknown

Discussion and Justification: Captures the electrical rhythm at the time of arrival at a destination, as previously defined. Reports could examine whether this rhythm differs from the initial rhythm of the patient when encountered in the field, whether there was improvement or deterioration, etc. If an EMS responder is not equipped with electrical monitoring capability or is not of an appropriate level to assess rhythm, this field should be coded as not applicable.

68.

Name of Data Element:	Respiratory Rate
Priority:	Essential
Definition:	Unassisted patient respiratory rate expressed as number per minute.
Code:	3 character numeric entry.

Data Items:

{respiratory rate}

888	Not obtained
999	Unknown

Content: Coded as 3 digit field.

Discussion and Justification: Component of several triage scoring systems and provides some assessment of severity of illness or injury. If a patient is not breathing and requires artificial ventilation, this data element should be coded as '000'.

69.

Name of Data Element:	Respiratory Effort
Priority:	Desirable*
Definition:	Patient respiratory effort.
Code:	1 character numeric entry.

Data Items:

0	Normal
1	Increased, not labored
2	Increased and labored, or, decreased and fatigued
3	Absent
9	Not assessed

* This field is essential for children. For purposes of the uniform data definition, children are defined as 18 years or younger.

Discussion and Justification: Respiratory effort is an integral component of pediatric emergency assessment, and is a major part of curricula dealing with pediatric emergencies. Respiratory effort is also potentially valuable in assessing adult patients.

Technical Comments: If the patient is an adult and it is decided to not collect this item for adults, this data element should be coded as 9, not assessed.

70.

Name of Data Element:	Systolic Blood Pressure
Priority:	Essential
Definition:	Patient's systolic blood pressure.
Code:	3 character numeric entry.

Data Items:

{systolic blood pressure}

888	Not obtained
999	Unknown

Content: Coded as 3 digit field.

Discussion and Justification: Important component of several scoring systems for triage, and permits some assessment of acuity of patient.

71.

Name of Data Element:	Diastolic Blood Pressure
Priority:	Desirable
Definition:	Patient's diastolic blood pressure.
Code:	3 character numeric entry.
Data Items:	
{diastolic blood pressure}	
888	Not obtained
999	Unknown

Content: Coded as 3 digit field. Code numbers should be right justified, using leading zeroes where necessary.

Discussion and Justification: Important component of several scoring systems for triage, and permits some assessment of acuity of patient.

72.

Name of Data Element:	Skin Perfusion
Priority:	Desirable*
Definition:	Patient skin perfusion, expressed as normal or decreased.
Code:	1 character numeric entry.
Data Items:	
1	Normal
2	Decreased
3	Not assessed

* This field is essential for children. For purposes of the uniform data definition, children are defined as 18 years or younger.

Discussion and Justification: Normal is defined as warm, pink, and with a capillary refill time of 2 or less seconds. Decreased is defined as cool, pale, mottled, dusky, and with a capillary refill time of greater than 2 seconds.

If the patient is hypothermic or febrile, this may affect skin perfusion. However, the skin perfusion should be scored consistently as defined above.

Technical Comments: If the patient is an adult and it is decided to not collect this item for adults, this data element should be coded as 9, not assessed.

73.

Name of Data Element:	Glasgow Eye Opening Component
Priority:	Essential
Definition:	Patient's eye opening component of the Glasgow coma scale.
Code:	1 character numeric entry.

Data Items:

1	None
2	Opens eyes in response to painful stimulation
3	Opens eyes in response to verbal stimulation
4	Opens eyes spontaneously
9	Unknown

Discussion and Justification: One of three components of the Glasgow coma scale, which is widely used to assess neurological status. The score and its components are also parts of a variety of triage scoring systems.

Technical Comments: If the data element is not assessed, code this data element as 9. If the score cannot be reconstructed from the run sheet at the time of data entry (e.g., is unknown), the element should also be coded as 9. A judgment that the data element is not applicable should not be made at the responder level. Instead, this can be made by generating data reports for specific conditions in which the data element is considered relevant, and examining the field for valid values.

74.

Name of Data Element:	Glasgow Verbal Component
Priority:	Essential
Definition:	Patient's verbal component of the Glasgow coma scale.
Code:	1 character numeric entry.

Data Items:

For patients >5 years:

1	None
2	Non-specific sounds
3	Inappropriate words
4	Confused conversation or speech
5	Oriented and appropriate speech
9	Unknown

For patients 2-5 years:

1	None
2	Moans, whimpers, unintelligible sounds
3	Inappropriate words
4	Confused conversation or speech
5	Appropriate words or speech
9	Not assessed

For patients 0-23 months:

1	None
2	Moans, whimpers
3	Irritable cry
4	Cries but consolable
5	Cries appropriately to stimulus, smiles, coos, fixes and follows
9	Not assessed

Discussion and Justification: One of three components of the Glasgow coma scale, which is widely used to assess neurological status. The score and its components are also parts of a variety of triage scoring systems.

Technical Comments: If the patient is intubated and deeply comatose, then this data element is coded as 1 for none, since there was no verbal response at the time of intubation. However, if the patient is intubated but not deeply comatose, and there is a possibility of verbal response, it is difficult to apply the Glasgow coma scale. The EMS responder can ask questions and if the patient can nod his head or blink eyes, etc. appropriately, then this element is coded as 5. In other instances, the data element should be coded as 9, or unknown.

If the data element is not assessed, code this data element as 9. If the score cannot be reconstructed from the run sheet at the time of data entry, the element should also be coded as 9. A judgment that the data element is not applicable should not be made at the responder level. Instead, this can be made by generating data reports for specific conditions in which the data element is considered relevant, and examining the field for valid values.

As a validity check, data analysts may run a report which reports the verbal score on all intubated patients. In the majority of instances, the score should be either 1 or 9.

75.

Name of Data Element:	Glasgow Motor Component
Priority:	Essential
Definition:	Patient's motor component of the Glasgow coma scale.
Code:	Numeric entry.

Data Items:

- For patients >5 years:

1	None
2	Extensor posturing in response to painful stimulation
3	Flexor posturing in response to painful stimulation
4	General withdrawal in response to painful stimulation
5	Localization of painful stimulation
6	Obeys commands with appropriate motor response
9	Unknown

For patients up to 5 years:

1	None
2	Extensor posturing in response to painful stimulation
3	Flexor posturing in response to painful stimulation
4	General withdrawal in response to painful stimulation
5	Localization of painful stimulation
6	Purposeful spontaneous movement
9	Not assessed

Discussion and Justification: One of three components of the Glasgow coma scale, which is widely used to assess neurological status. The score and its components are also parts of a variety of triage scoring systems.

Technical Comments: This component cannot be assessed if the patient has received a muscle relaxant. If the data element is not assessed, code this data element as 9. If the score cannot be reconstructed from the run sheet at the time of data entry, the element should be coded as 9. A judgment that the data element is not applicable should not be made at the responder level. Instead, this can be made by generating data reports for specific conditions in which the data element is considered relevant, and examining the field for valid values.

76.

Name of Data Element:	Glasgow Coma Score (Total)
Priority:	Desirable
Definition:	Patient's total Glasgow coma scale score.
Code:	2 character numeric entry.

Content: Calculated 2 digit character field. It is a sum of the eye opening, verbal and motor response components.

Discussion and Justification: Important component of several triage scoring systems. Provides information about severity of neurologic disorder.

Technical Comments: The range of the score is 3 to 15. This data element should not be directly entered. Before generating this value, each of the components should be checked to make certain that '9' is not recorded within them. If any of the components are '9', then the score cannot be calculated and should be coded as '99'. Reports based on the Glasgow coma score should be programmed to skip records with '99' as the value of this data element. This data element should be zero padded if the total score is less than 10 to assure 2 digit field width.

77.

Name of Data Element:	Revised Trauma Score
Priority:	Desirable
Definition:	Patient's revised trauma score.
Code:	2 character numeric entry.

Content: Coded as 2 digit field.

Discussion and Justification: One example of a triage scoring system which may be used to categorize injured patients in an EMS system. This data element is considered desirable, but the intention is that local agencies use scoring systems which are applicable to their own purposes. Most of these scoring systems should be calculable from other data elements which are included as core elements of the uniform data set.

Other scoring systems which are used in EMS information systems include the CRAMS, the Trauma Index, the Trauma Score (Champion), the Glasgow coma scale, APACHE, PRISM, Hanover Intensive Score (HIS), AIS and ISS. It is recommended that experience be gained with these scoring systems, emphasizing scoring systems which can be automatically calculated from components which are designated as core data elements.

Technical Comments: The revised trauma score may be calculated from other data elements. It is the sum of a respiratory rate component, systolic blood pressure component, and a neurologic component.

Respiratory Rate Component

4 10 - 29 per minute
3 >29 per minute
2 6 - 9 per minute
1 1 - 5 per minute
0 None spontaneous

Systolic Blood Pressure Component

4 >89 mm Hg
3 76 - 89 mm Hg
2 50 - 75 mm Hg
1 1 - 49 mm Hg
0 No pulse

Neurologic Component

4 Glasgow coma score 13 - 15
3 Glasgow coma score 9 - 12
2 Glasgow coma score 6 - 8
1 Glasgow coma score 4 - 5
0 Glasgow coma score 3

If the score cannot be calculated because of absent component data or is unknown, then the score should be coded as '88', while if the score is not applicable (e.g., a non-injury patient) then it should be coded as '99'.

78.

Name of Data Element:	Procedure or Treatment Name
Priority:	Essential
Definition:	Identification of procedure attempted or performed on patient.
Code:	4 character numeric entry.

Data Items:

96.70	Assisted ventilation (positive pressure)
93.59	Backboard
39.98	Bleeding controlled
93.57	Burn care
99.60	Cardiopulmonary resuscitation
93.52	Cervical immobilization
31.10	Cricothyrotomy
89.51	ECG monitoring
96.04	Endotracheal intubation
99.63	External cardiac massage
99.62	External defibrillation (includes auto)
38.93	Intravenous catheter
41.92	Intraosseous catheter
99.29	Intravenous fluids
93.58	MAST (military antishock trousers)
96.01	Nasopharyngeal airway insertion
96.05	Nasogastric tube insertion
73.59	Obstetrical care (delivery)
96.02	Oropharyngeal airway insertion
93.96	Oxygen by mask
93.96	Oxygen by cannula
93.54	Splint of extremity
93.54	Traction splint

Discussion and Justification: Intended to provide planners and educators with information about which procedures are conducted in the field, by whom, and for what indications. Procedures are defined here as anything done by way of assessment or treatment of the patient. Thus, application of a cervical collar is a treatment, use of a cardiac monitor is a tool of assessment, and drawing blood tubes is neither a specific treatment nor a means of field assessment. All of these would be considered procedures for purposes of this data element. It is likely that each responder agency will have its own list of procedures which are authorized for its EMS responders, and this list should be used for the data collection efforts of the agency. The procedures listed above and detailed below are not a restrictive list, nor is it expected that every agency will permit its providers to carry out all of these procedures. These lists are intended as samples, while the coding scheme should remain consistent. The coding system used above is the ICD-9 Procedure Classification (p codes) with the decimal point removed.. For the procedures listed above, the ICD-9 p code has

been indicated. Agencies should identify the codes from the ICD-9 manual, of other authorized procedures which they plan to track in their data collection system.

Technical Comments: Multiple entries will be needed, and should be separated into multiple fields in a flat file structure, or preferably, should be placed in a separate relational file to permit unlimited numbers of procedure entries. Using the latter type of architecture will also facilitate adding fields for numbers of attempts, time of the procedures, and identification of the individuals performing the procedures. There is no question that the relational model is preferred to the flat file approach, but it is recognized that more investment of time and effort is required to properly design the relational architecture.

79.

Name of Data Element:	Procedure Attempts
Priority:	Desirable
Definition:	Total number of attempts for each procedure attempted, regardless of success.
Code:	1 character numeric entry.

Discussion and Justification: For procedures which are performed on the patient, this field indicates the number of attempts required. In most instances, this number will be 1. This data element permits educators to know whether certain procedures are posing particular technical problems in the field.

Technical Comments: This data element should be combined in a relational file with the procedures conducted on a given patient. This will permit optimal data base design, as pointed out in the Technical Comments concerning procedure names.

80.

Name of Data Element:	Medication Name
Priority:	Essential
Definition:	Medication name.
Code:	3 character numeric/decimal entry

Data Items:

01.1	Diphenhydramine	09.2	Morphine
02.1	Atropine	10.1	Naloxone
03.1	Albuterol	11.1	Acetaminophen
03.2	Terbutaline	12.1	Diazeepam
03.3	Dopamine	13.1	Magnesium sulfate
03.4	Epinephrine	14.1	Lorazep
03.5	Isoproterenol	15.1	Sodium bicarbonate
03.6	Metaproterenol	16.1	Calcium chloride
04.1	Succinylcholine	16.2	Calcium gluconate
05.1	Heparin	17.1	Dextrose and water (50%)
06.1	Adenosine	18.1	Furosemide
06.2	Bretylium tosylate	18.2	Mannitol
06.3	Lidocaine	18.3	Bumetanide
06.4	Procainamide	19.1	Charcoal, activated
06.5	Verapamil	20.1	Ipecac
06.6	Nifedipine	21.1	Metoclopramide
07.1	Amyl nitrate	22.1	Dexamethasone
07.2	Nitroglycerin	22.2	Methylprednisolone
08.1	Aspirin	23.1	Glucagon
09.1	Meperidine	24.1	Thiamine

Discussion and Justification Intended to provide planners and educators with information about which medications are administered in the field, by whom, and for what indications. It is likely that each responder agency will have its own list of medications which are carried by the response vehicles, and this list should be used for the data collection efforts of the agency. The medications listed above and detailed below are not a restrictive list, nor is it expected that every agency will permit its providers to use all these drugs. These lists are intended as samples, while the coding scheme should remain consistent statewide .

Technical Comments: To facilitate additions and deletions in the medications listing while preserving a coding scheme, data items are listed based on groupings used in the American Hospital Formulary Service (1993) (AHFS) as described below.

The data item coding is numeric with decimal delimiters. The number preceeding the decimal, indicates an AHFS grouping. The number following the decimal identifies a medication in a given AHFS grouping.

Multiple entries may be needed, and should be separated into multiple fields in a flat file structure, or preferably, should be placed in a separate relational file to permit unlimited numbers of drug entries. Using the decimal/numeric type of architecture will also facilitate adding fields for dose, route, and time of administration, for those agencies which wish to computerize that information.

01. ANTIHISTAMINE DRUGS
01.1 *Diphenhydramine hydrochloride:*

02. AUTONOMIC DRUGS
ANTICHOLINERGIC AGENTS
ANTIMUSCARINIC/ANTISPASMODICS
02.1 *Atropine*

03. AUTONOMIC DRUGS
SYMPATHOMIMETIC (ADRENERGIC) AGENTS
03.1 *Albuterol*
03.2 *Terbutaline*
03.3 *Dopamine*
03.4 *Epinephrine hydrachlolide:*
03.5 *Isoproterenol*
03.6 *Metaproterenol*

04. AUTONOMIC DRUGS
SKELETAL MUSCLE RELAXANTS
04.1 *Succinylcholine*

05. BLOOD FORMATION
COAGULANTS AND ANTICOAGULANTS
ANTICOAGULANTS
05.1 *Heparin*

06. CARDIOVASCULAR DRUGS
CARDIAC DRUGS
06.1 *Adenosine*
06.2 *Bretylium tosylate*
06.3 *Lidocaine*
06.4 *Procainamide*
06.5 *Verapamil*
06.6 *Nifedipine*

07. CARDIOVASCULAR DRUGS
VASODILATING AGENTS
07.1 *Amyl nitrate -*
07.2 *Nitroglycerin-*

08. CENTRAL NERVOUS SYSTEM DRUGS
ANALGESICS AND ANTIPYRETICS
NONSTEROIDAL AGENTS
08.1 *Aspirin*

09. CENTRAL NERVOUS SYSTEM DRUGS
ANALGESICS AND ANTIPYRETICS
OPIATE AGONISTS
09.1 *Meperidine*
09.2 *Morphine*

10. CENTRAL NERVOUS SYSTEM DRUGS
ANALGESICS AND ANTIPYRETICS
OPIATE ANTAGONISTS
10.1 *Naloxone*

11. CENTRAL NERVOUS SYSTEM DRUGS
ANALGESICS AND ANTIPYRETICS
MISCELLANEOUS AGENTS
11.1 *Acetaminophen*

12. CENTRAL NERVOUS SYSTEM DRUGS
ANTICONVULSANTS
BENZODIAZEPINES
12.1 *Diazepam*

13. CENTRAL NERVOUS SYSTEM DRUGS
ANTICONVULSANTS
MISCELLANEOUS AGENTS
13.1 Magnesium sulfate

14. CENTRAL NERVOUS SYSTEM DRUGS
AXOLYTICS, SEDATIVES, AND HYPNOTICS
BENZODIAZEPINES .
14.1 *Lorazepam*

15. ELECTROLYTE, CALORIC AND WATER BALANCE
ALKALINIZING AGENTS
15.1 *Sodium bicarbonate*

16. ELECTROLYTE, CALORIC AND WATER BALANCE
REPLACEMENT SOLUTIONS
16.1 *Calcium chloride*
16.2 *Calcium gluconate*

17. ELECTROLYTE, CALORIC AND WATER BALANCE
CALORIC AGENTS

17.1 *Dextrose and water (50%)*

18. ELECTROLYTE, CALORIC, AND WATER BALANCE
DIURETICS

18.1 *Furosemide*

18.2 *Mannitol*

18.3 *Bumetanide*

19. GASTROINTESTINAL DRUGS
ANTACIDS AND ADSORBENTS

19.1 *Charcoal, activated*

20. GASTROINTESTINAL DRUGS
EMETICS

20.1 *Ipecac*

21. GASTROINTESTINAL DRUGS
MISCELLANEOUS GI DRUGS

21.1 *Metoclopramide*

22. HORMONES AND SYNTHETIC SUBSTITUTES
ADRENALS

22.1 *Dexamethasone*

22.2 *Methylprednisolone*

23. HORMONES AND SYNTHETIC SUBSTITUTES
ANTIDIABETIC AGENTS
MISCELLANEOUS AGENTS

23.1 *Glucagon*

24. VITAMINS

24.1 *Thiamine*

81.

Name of Data Element:	Treatment Authorization
Priority:	Desirable
Definition:	Indicates the type, if any, of treatment authorization.
Code:	1 character numeric entry.

Data Items

1	Protocol (standing orders)
2	On-line (radio telephone)
3	On-scene
4	Written orders (patient specific)
8	Not applicable
9	Unknown

Discussion and Justification: Enables managers of EMS systems to determine the authorization type used for emergency medical care provided on specific EMS runs. This data may be of used for determining legal accountability and for auditing the supervision of EMS systems.

Technical Comments:
Following is a more detailed explanation of the Data Items that define Treatment Authorization:

1 Protocol (standing orders)
Pre-established physician authorized procedures or guidelines for medical care of a specified clinical situation, based on patient presentation. Also known as standing orders. The pre-establishment of protocols is the responsibility of a physician having responsibility for medical direction of an EMS system.

2 On-line (radio telephone)
Immediate physician orders to EMS provider through direct telecommunications such as radio or telephone. Also known as *on-line medical direction.*

3 On-scene
Immediate orders to an EMS provider by a physician at the scene of the medical emergency who has officially assumed responsibility for the management of the prehospital care of the patient.

4 Written orders (patient specific)
Written orders by a physician having on-going or continuing responsibility for the medical care of the patient, to an EMS provider regarding the prehospital care of the patient. The

orders must accompany the patient, must be in writing, and must be signed by the responsible physician. Also known as *advanced medical directions*. An example is "Do Not Resuscitate" orders.

5 Not Applicable

Citation of authorization is not applicable or indicated, such as in cases where no medical treatments are provided, or no treatments requiring explicit physician authorization are administered.

6 Unknown

Applicable authorization for treatment not recorded or not known by the EMS provider, such as cases where prehospital skills and treatments are applied by an EMS provider based on his training and experience, without knowledge of the existence of applicable protocols. This is a default data entry, to be used when none of the other above data items are recorded.

ALPHABETICAL LISTING OF ESSENTIAL AND DESIRABLE UNIFORM PRE-HOSPITAL DATA ELEMENTS

Name	Tag No.	Definition	Pg
Age	41	Patient's age or best approximation	F2-26
Agency/Unit Number	24	Number that identifies the agency and unit responding to an incident	F2-18
Cause of Injury	49	External cause of injury	F2-33
Chief Complaint	48	Statement of problem by patient or other person	F2-32
City of Residence	34	Patient city or township of residence	F2-23
County of Residence	35	Patient county or parish where patient resides	F2-23
Crew Member One Number	26	Personnel certification/license number for first crew member	F2-19
Crew Member One Type	29	Personnel certification/license level of crew member	F2-20
Crew Member Two Number	27	Personnel certification/license number for second crew member	F2-19
Crew Member Two Type	30	Personnel certification/license level of crew member	F2-21
Crew Member Three Number	28	Personnel certification/license number for third crew member	F2-20
Crew Member Three Type	31	Personnel certification/license level of crew member	F2-21
Date of Birth	40	Patient's date of birth	F2-26
Date Incident Reported	8	Date the call is first received by PSAP or other designated entity	F2-9
Date Unit Notified	11	Date response unit is notified by EMS dispatch	F2-10
Destination/ Transferred to	44	Health care facility or prehospital unit/home that received patient from EMS responder providing this record	F2-28
Destination Determination	45	Reason a transport destination was selected	F2-29
Diastolic Blood Pressure	71	Patient's diastolic blood pressure	F2-57
Factors Affecting EMS Delivery	56	Special circumstances affecting the EMS response or delivery of care	F2-48

Name	Tag No.	Definition	Pg
Gender	42	Gender of patient	F2-27
Glasgow Coma Score (Total)	76	Patient's total Glascow coma scale score	F2-62
Glasgow Eye Opening Component	73	Patient's eye opening component of the Glascow coma scale	F2-58
Glasgow Motor Component	75	Patient's motor component of the Glascow coma scale	F2-60
Glasgow Verbal Component	74	Patient's verbal component of the Glascow coma scale	G2-61
Incident Address	1	Address where patient was found, or address to which unit responded	F2-2
Incident City	2	City or township where patient was found	F2-3
Incident County	3	County or parish where patient was found	F2-4
Incident Number	21	Unique number for each incident reported to dispatch	F2-16
Incident/Patient Disposition	47	End result of EMS response	F2-30
Incident State	4	State, territory, Province or District where patient found	F2-5
Initial Cardiac Rhythm	66	Initial monitored cardiac rhythm as interpreted by EMS personnel	F2-54
Injury Description	53	Clinical description of injury type and body site	F2-44
Injury Intent	54	Intent of individual inflicting injury	F2-46
Lights and Sirens To Scene	19	The use of lights and sirens to scene	F2-14
Lights and/or Sirens Used from Scene	46	Use of lights and/or sirens from the scene	F2-29
Location Type	5	Type of location of incident	F2-5
Medication Name	80	Medication name	F2-65
Onset Date	6	Date of onset of symptoms or injury date	F2-8
Onset Time	7	Time of onset of symptoms or injury time	F2-8

Name	Tag No.	Definition	Pg
Patient Care Record Number	23	Unique number for each patient care record (PCR)	F2-17
Patient Name	32	Patient name	F2-22
Patient Street Address	33	Patient's street address	F2-22
Pre-existing Condition	51	Pre-existing medical conditions known to the provider	F2-42
Procedure Attempts	79	Total number of attempts for each procedure attempted, regardless of success	F2-64
Procedure or Treatment Name	78	Identification of procedure attempted or performed on patient	F2-63
Provider of First CPR	59	Person who performed first CPR on patient	F2-50
Provider Impression	50	Provider's clinical impression which led to the management given to the patient	F2-38
Pulse Rate	65	Patients palpated or auscultated pulse rate expressed in n/min	F2-53
Race/Ethnicity	43	Patient's racial and ethnic origin	F2-27
Respiratory Effort	69	Patient's respiratory effort expressed in phases 0-3	F2-56
Respiratory Rate	68	Unassisted patient respiratory rate expressed in n/min	F2-55
Response Number	22	Unique number for each individual response by a response unit to an incident	F2-17
Return of Spontaneous Circulation	64	Whether a palpable pulse of blood pressure was restored following cardiac arrest and resuscitation in the field	F2-52
Revised Trauma Score	77	Patient's revised trauma score	F2-61
Rhythm at Destination	67	Monitored cardiac rhythm upon arrival at destination	F2-55
Safety Equipment	55	Safety equipment in use by patient at time of injury	F2-47
Service Type	20	Type of service requested	F2-15
Signs and Symptoms Present	52	Signs and symptoms reported to or observed by provider	F2-43
Skin Perfusion	72	Patient skin perfusion expressed as normal or decreased	F2-57

Name	Tag No.	Definition	Pg
Social Security Number	39	Patient's Social Security number	F2-25
State of Residence	36	State, territory, province, or District of Columbia, where patient resides	F2-24
Suspected Alcohol/ Drug Use	57	Suspected alcohol or drug use by patient	F2-49
Systolic Blood Pressure	70	Patient's systolic blood pressure	F2-56
Telephone Number	38	Patient's primary telephone number	F2-25
Time Back in Service	18	Time response unit back in service available for response	F2-14
Time CPR Discontinued	60	Time at which medical control or responding unit terminated resuscitation efforts in the field	F2-50
Time Dispatch Notified	10	Time of first connection with EMS dispatch	F2-10
Time Incident Reported	9	Time call is first received by PSAP or other designated entity	F2-9
Time of Arrival at Destination	17	Time when patient arrives at destination or transfer point	F2-13
Time of Arrival at Patient	15	Time response personnel establish first direct contact with patient	F2-12
Time of Arrival at Scene	14	Time EMS unit stops physical motion at scene (last place unit or vehicle stops prior to assessing patient)	F2-12
Time of First CPR	58	Best estimate of time of first CPR	F2-49
Time of First Defibrillatory Shock	63	Time of first defibrillatory shock	F2-52
Time of Witnessed Cardiac Arrest	61	Time of witnessed cardiac arrest	F2-51
Time Unit Left Scene	16	Time response unit began physical motion from scene	F2-13
Time Unit Notified	12	Time response unit is notified by EMS dispatch	F2-11
Time Unit Responding	13	Time response unit begins physical motion	F2-11
Treatment Authorization	81	Indicates the type, if any, of treatment authorization	F2-69
Vehicle Type	25	Type of vehicle which responded to incident	F2-18
Witness of Cardiac Arrest	62	Person who witnessed cardiac arrest	F2-51
Zip Code of Residence	37	Zip code of patient's residence	F2-24

APPENDIX G

PLENARY SESSION PAPER

WHERE DO WE GO FROM HERE?

WHERE DO WE GO FROM HERE

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How Important Is EMS Data?

The goal of EMS is to match appropriate available medical resources to the needs of the emergency medical patient, in a timely, systematic manner, to prevent unnecessary mortality and morbidity. EMS data provide the documentation to demonstrate what makes a difference to patient outcome and the effectiveness of the EMS system. Statewide, EMS data provide a source of population-based data which are routinely available to monitor statewide trends over time. They are the only source of patient-specific EMS medical outcome, system effectiveness, healthcare prevention and EMS management information which link the events at the scene and enroute to the events at the hospital.

What Current National Trends Affect EMS Data?

Trend Toward Standardization of Data

Standardization of data is seen as a cost-effective solution to improving the usefulness and quality of routinely collected data. The National Highway Traffic Safety Administration (NHTSA), along with the National Safety Council, the National Association of Governor's Highway Safety Representatives (NAGHSR) and the American Association of Motor Vehicle Administrators (AAMVA), support adoption of the Critical Automated Data Reporting Elements (CADRE) for traffic records systems for state and national highway safety analyses. In the medical community, the American Society of Testing Materials (ASTM) Committee F30 on Emergency Medical Services is reviewing draft guidelines for standardized emergency medical services management information system (EMS-MIS) data. The work of this Committee was used as one of the reference sources to develop the data elements reviewed by this Conference. The Agency for Health Care Policy and Research (AHCPR) and the Health Care Financing Administration (HCFA) have standardized electronic billing data which also are useful for medical outcome studies. Professional associations, such as the American College of Surgeons (ACS) and the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), have standardized criteria to support improvement in the timeliness and appropriateness of clinical care.

Increased Political Support

At the same time, more people are becoming aware of the usefulness of statewide medical data and are demanding access. However, access to medical data traditionally is restricted by laws and regulations designed to protect patient confidentiality. Restricted access conflicts with the public's need to know in order to reduce healthcare costs. The conflict between restrictive access and the demand for more information has led to increased political support for relaxing access restrictions as a more cost-effective option compared to creating duplicate or new data systems.

Increased Data Linkage

Linkage is an effective strategy for generating more information without the expense and delay of new data collection. NHTSA has demonstrated that it is feasible to link large statewide data files using probabilistic linkage techniques. Standardization helps to eliminate the linkage obstacles caused by non-uniform file structures and field definitions. The linkage process itself requires collaboration between the owners and users of the data which in turn has the rippling effect of facilitating future cooperation among them.

Improved Computer Capabilities

Newly developed microcomputers have greater capabilities which enhance the development and usefulness of state data. Computerized clip-boards and lap-top computers enable the data collector to edit the data inexpensively and with more precision at the time of entry. Timely computerization of the data at the scene empowers the EMS manager to use the data to manage problems as they occur before they become crises. Computerization facilitates data processing and linkage. The capabilities of the new microcomputers free EMS managers from being held hostage by the delays and expense associated with mainframe computers. Instead, when the data are standardized, subsets can be uploaded for merging at regional and state data centers, or exported for registries or research.

Current Obstacles

There are many obstacles to the standardization and linkage of EMS data. The potential analytical value of emergency medical services data contrasts with its limited access and availability. Accurate, complete and uniform EMS data are difficult to obtain when the data items themselves are not important to the EMTs collecting the data or to the EMS manager who does not know how or may not want to use EMS data for management and planning purposes. In these instances it is not surprising that EMS data are not uniform or that computerization is service or facility

based rather than statewide. Service or facility based systems are defended strongly by their developers and users. A new data system may be perceived as inadequate compared to the old system. There may be concern about who will pay for the new computer equipment and the staff time necessary to convert existing data systems to accept newly standardized file structures and variable definitions. Increased expenses also may be feared because of the need for more comprehensive edits and logic checks to improve data quality for linkage and analytical activities. Thus, terminating a data system may have political ramifications. Interagency politics may discourage cooperation. Patient confidentiality may serve as a convenient scapegoat to avoid resolving the political problems.

What Are The Advantages Of Data Linkage?

Linkage of pre-hospital EMS data to police and hospital data provides information to track emergency patients from the scene through to final disposition to determine the medical and financial consequences. Data are collected on different records, collected at the scene, enroute, in the emergency department, at the acute care hospital, in rehabilitation and long term care facilities, at the time of death, when a reimbursement claim is filed and/or when other funds are needed to provide long term support. Other data, such as census, registration, licensure and test data, provide additional descriptive information to explain the event. Appendix A describes each of the data sources. The relationship of these various data sources to each other is presented in Figure 1. When these data sources are linked, EMS data are strengthened.

Improves Emergency Medical Care

Linkage improves the delivery of emergency medical services (EMS). For example, physicians in many parts of the country are experimenting with crash dynamics to develop practice guidelines for "predicting" the organ systems involved. Emergency department physicians and trauma surgeons use these data to streamline the triage process by "anticipating" what types of injuries to expect. This multi-disciplinary approach improves patient outcome and encourages a collaborative relationship between highway safety and EMS. Linked crash and EMS data also may highlight unnecessary delays by police in notifying EMS. The collaboration required to correct this problem improves coordination between local police and EMS. EMS data linked to other medical outcome data provides quality improvement information for EMS managers to evaluate the medical effectiveness of pre-hospital care and the skill performance of EMS providers.

Improves Data Quality

Linkage improves data quality. The linkage process is particularly valuable in identifying errors in military times, dates and ages which cannot be identified during routine processing. Data linkage highlights the need for comprehensive edits and logic checks and usually leads to a higher priority being assigned to improving data quality.

Expands Usefulness of Existing EMS Data

Linkage expands the usefulness of each data file being linked. It provides EMS with the ability to access non-EMS state data to identify and evaluate emergency patients who did not receive EMS care but who should have. For example, linkage to the crash data provides EMS with information about all occupants who are injured in a motor vehicle crash, not just those transported by EMS. This information can be used to evaluate the responsiveness of EMS given the location and circumstances of the crash. Linkage of EMS to the hospital data provides EMS with information about what happens to EMS transported patients after EMS leaves. It also identifies acute care patients seriously injured in motor vehicle crashes who are not transported by EMS.

Increases Importance of EMS Data to Non-EMS Users

Linkage improves the usefulness of EMS data for highway safety, the hospital medical community and legislators. Highway safety uses the linked data to determine the medical consequences for particular types of crashes. The data indicate to highway safety if roadside safety improvements are worth the expense and inconvenience relative to improved medical outcome. They also indicate when expected benefits are undermined by low utilization rates for occupant protective devices, high utilization of alcohol/drugs, or inappropriate response by EMS. The linkage also provides information to evaluate the biomechanics of crashes. EMS data linked to the hospital data provide the medical community with information about what happened before the victim arrived at the hospital. State legislators and local decision makers find linked EMS medical outcome state data a powerful source of information to support their healthcare initiatives.

What DOT Activities Support The Development Of EMS Data?

Within the highway safety community there are several activities which support the development of EMS data.

NHTSA/CDC National Survey

NHTSA is assisting the Centers for Disease Control to develop and

implement a survey of existing resources and collaborative relationships which facilitate data linkage in each of the 50 states. The survey collects information about specific barriers, particularly those institutional, legislative, proprietary and data format requirements which interfere with linkage. The survey information will describe variations in EMS data capabilities for all states nationally and provide a reference point against which a state's efforts to reduce linkage obstacles may be measured.

Private Standard-Setting Organizations

NHTSA supports the activities of the American Society of Testing Materials (ASTM) Committee F30 on Emergency Medical Services and the American National Standards Institute (ANSI), both private standard setting organizations involved in developing voluntary consensus standards related to health and safety. Although both organizations seek to avoid duplication which leads to inefficiency, the standard setting process differs slightly in each. In ASTM, the membership develops and reviews the standards. ANSI grants approval after experts have developed the recommendations and obtained letters of support to indicate consensus. Both groups have been working with EMS data elements. The ASTM Committee F30 on Emergency Medical Services has focused on the data needed for an emergency medical services management information system. NHTSA has been working with the American Association of Motor Vehicle Administrators to obtain ANSI approval for updates to the D20.1 Data Element Dictionary for Traffic Records Systems. NHTSA will submit the EMS data elements recommended as the result of this Conference to both groups as reference material for subsequent updates of their existing documents.

CODES

NHTSA is funding the linkage of state data in Hawaii, Maine, Missouri, New York, Pennsylvania, Utah and Wisconsin to develop Crash Outcome Data Evaluation Systems (CODES). Using probabilistic linkage techniques, the states will generate linked state crash and injury data for a report to Congress on the benefits of safety belts and helmets as mandated by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). In order to eliminate linkage obstacles, each state is required to establish a state advisory committee consisting of the owners and users of state crash and injury data, including EMS. NHTSA will encourage the CODES states to submit the EMS data elements to their CODES advisory committees to discuss the importance of the elements for linkage and analytical purposes. These committees serve as an existing mechanism within a state to assist EMS to develop the resources and political support to implement the EMS data elements and develop new applications for their use.

NAGHSR Sensitivity Index Project

NHTSA also is collaborating with the National Association of Governor's Highway Safety Representatives (NAGHSR) on the Sensitivity Index Project. The Sensitivity Index consists of eight indicators, reported statewide, by severity or by population per square mile, which generate information for inter and intra state comparisons of the timeliness and utilization of EMS.

As part of this Project, NHTSA will distribute a simpler version of the probabilistic linkage software than that used by CODES, MINICODES, free to all states interested in linking their existing state crash, EMS and hospital data. MINICODES also automates calculations for the Sensitivity Index for implementation after the crash and EMS linkage is completed.

ISTEA Safety Management System

ISTEA also requires that states set up six highway management systems, one of which is a Safety Management System (SMS). The provisions for the SMS are in the process of being codified. The final regulations submitted for public review provide that EMS data will be required as one of the sources of data to be included in the SMS. Inclusion of EMS data will provide NHTSA with information needed to evaluate the impact of all countermeasures for eliminating mortality and morbidity caused by motor vehicle crashes. The same data will enable the Federal Highways Administration to evaluate the effectiveness of planned roadway safety designs in terms of potential reductions in highway related deaths and injuries. The linked crash injury databases, including EMS data now being developed under NHTSA's CODES projects, may serve as useful models to be considered for the ISTEA Safety Management System. NHTSA will assist the state EMS Directors to take an active role in the overall planning and use of EMS data in the development of the Safety Management System in their states.

Where Do We Go From Here?

The DOT/NHTSA activities described above indicate where highway safety interest groups are going with respect to standardization, development, and use of EMS databases. However, success depends on the ability to look beyond our parochial interests. A broader perspective highlights the needs of EMS, the medical care system, public health, highway safety and injury control, and their relative impact on each other. When both data owners and data users reach consensus about the variable definitions and file structures, the consensus results are more likely to be relevant to the users and accepted by the owners for implementation. More importantly, a formal consensus process provides a mechanism to

update and revise consensus standards in a timely manner as standards of care change. Federal policy supports the use of voluntary consensus standards as the basis of mandated federal health and safety regulations and the implementation of these standards by state and local governments, by vendors of data systems, and by the International Organization for Standardization (ISO). Our work in refining the proposed data elements for EMS has been a necessary prerequisite for achieving an appropriate level of consensus to facilitate implementation of the EMS data elements.

Mister Chairman, I propose that the group now discuss the following questions as the basis for determining what should be done next.

1. Are all of the data elements ready for recommendation as a national standard? Are the data elements "acceptable" as is? If not, what additional work must be done? Should there be an additional delay to test the final recommendations?

2. How should the remaining work and future revisions be carried out? Currently there are two major national voluntary consensus standards organizations in the United States, ASTM and ANSI. In spite of the fact that ANSI and ASTM differ slightly in their consensus development processes, they have joined forces through ANSI Committee HR7. The purpose of HR7 is to reduce duplication, and to expedite and coordinate standardization in medical informatics, including EMS data.

   What obstacles currently exist which prevent development of national voluntary consensus standards on EMS data? Is it feasible to remove the obstacles at this time or is disagreement on the use of the established national voluntary consensus process inevitable? Should other organizations assist the national standards development organizations and who are they?

3. What strategies should be implemented to ensure acceptance of the standardized EMS data elements by states? EMS state data systems are owned by states. Many states are suffering from decreasing budgets, furlough days and limited staff. These states have neither the interest, time nor funds to develop or revise their existing EMS data systems. Even when EMS funds are available, EMS Directors and others frequently assign the lowest priority to developing and maintaining EMS data systems. Since 100% compliance with all of the data elements is not feasible, what level of compliance is sufficient? What are the consequences to EMS if data elements are not implemented in a reasonable length of time, and what is the definition of reasonable? What

strategies and incentives should be developed to convince states to assign a higher priority to the standardization of EMS data? Is it necessary for the EMS data elements to be incorporated into the decision making process governing funding? Is a data system derived from patient care information sufficient for funding decisions? Would increased use of EMS data by non-EMS users provide more resources to EMS, or is the problem more one of EMS personnel lacking the expertise, and thus interest, to assign scarce EMS resources to a consensus process?

4. What level of technology is necessary to implement the recommended EMS data elements, and who should pay for it? What is an acceptable level of technology to implement the data elements? Should the state or the local EMS services be required to pay for the computerized clipboards, voice activated equipment, or other computer technology? Should EMS work with police, other emergency providers and the healthcare system to share resources to ensure the availability of adequate technology?

Appendix A
Sources Of Event-Specific Data

Crash Report

The crash report data describe the vehicle(s) and occupant(s) involved in a specific crash at a specific location, date and time. Crash reports are submitted for specific types of crashes as defined by state regulations. Most crash data systems report information for the drivers and injured occupants. Some record information for all occupants. This database is useful for EMS because, after linkage, it provides a source of information for victims injured in crashes who are not transported by EMS.

Emergency Medical Services

The Emergency Medical Services (EMS) database, usually mandated statewide according to a uniform format, includes information about victims who are treated and transported by EMS. A separate report is completed to record the status, treatment and disposition of the victim by each EMS service which responds (first responder, basic life support, advanced life support, air transport). EMS reports are the first medical records completed at the scene for persons experiencing a medical emergency, and the first reports to record severity in physiological terms which can be related to survival. The EMS database is the only source of routinely collected medical information indicating the treatment provided at the scene and enroute to the hospital. Utilization of occupant protection devices and alcohol/substances recorded in the EMS data may be used to corroborate similar information on the crash report. None of the records include information about crash victims not transported by EMS. Most EMS reports include some billing information.

Emergency Department

The victim's arrival at the emergency department is recorded in the emergency department log and by the triage nurse. The patient record is completed by the attending physician, nurses, and the medical and mental health consultants who provide treatment. In addition, billing information is collected. The emergency department is the only source of information about the treatment and disposition of crash victims who are not transported by EMS but who obtain outpatient medical treatment at a hospital. It also provides information about the additional treatment and disposition for those crash victims who were transported by EMS. However, only a few states have tried to computerize this information statewide. More and more hospitals are trying to expand their emergency department computerized

billing systems to include patient care and disposition data elements to improve the accessibility of emergency department data for quality improvement.

Hospital Inpatient and Rehabilitative Records

Once admitted as an inpatient for acute and later for rehabilitative care, a medical record is completed during the victim's length of stay. At the time of discharge, the record is abstracted for third-party billing and also merged by most states into a statewide database to monitor hospital utilization. This database is the only source of routinely collected and computerized financial information describing hospital total charges and, in some states, hospital-based physician charges for victims injured in crashes. It also lists the final medical diagnoses describing the victim's injuries which can be converted to an abbreviated injury score (AIS) or injury severity score (ISS). However, it does not computerize information about the utilization of occupant protection devices. Alcohol related information, although available in some instances, may be restricted from public access.

Long Term Healthcare Information

More seriously injured crash victims may require long-term medical care. Long-term care data are the only routinely collected source of information about the long-term charges for care and the permanent functional status of the crash victim. Although several states are participating in a pilot test to create statewide long-term care databases, most of this information is accessible only directly from the facilities where the crash victims are treated.

Death Certificate

The death certificate database includes medical causes, time, location and, for injury deaths, the mechanism of injury, including those caused by motor vehicle crashes. The death certificate also records, although this information is not always computerized, the time and location for the onset of an injury which can be used to corroborate information on the crash and EMS reports.

Other Injury Data Systems

Medical status, treatment and disposition information for emergencies may be obtained from other injury data systems generated by hospitals, health maintenance organizations and governmental agencies. The Fatal Accident Reporting System (FARS) provides information for all victims of motor vehicle crashes nationally who die within 30 days of the crash or who suffer non-fatal injuries in the fatal crash. Trauma registry

data provide detailed data about the timeliness and appropriateness of clinical care provided to patients treated at trauma centers and, thus, are considered a subset of the EMS and hospital data for those patients with the most serious injuries. Ambulatory/primary care data describe hospital outpatient surgery and non-hospital outpatient care which may provide an excellent source of information about EMS success stories.

Claims

Claims data generated for reimbursement purposes provide financial information and limited medical and treatment information. The advantage of claims data is that they may include both outpatient and inpatient medical and reimbursement information. The disadvantage is that the data reflect requirements for reimbursement and may not provide the detailed medical information required to evaluate patient outcome. Different claims data provide information about different groups of emergencies. Medicare provides data about emergency victims over 65 years of age. Medicaid data describes the population in need of public assistance. Worker's Compensation data describe emergencies at the work place. Private insurance data, such as Blue Cross/Blue Shield and ALLSTATE, provide information about its members.

Social Support

Medical emergencies may also incur non-medical expenses. Disability and supplemental income benefits for victims under 65 years of age are recorded in databases generated by Supplemental Security Income (SSI), In-Home Support Services (IHSS), Homemaker and other custodial care.

Sources Of Non-Event Specific Descriptive Information

Linkage to other descriptive information provides access to details about the geographic location, vehicle, driver and roadway which are not related to the specific emergency event. These databases include census, vehicle registration, driver history and roadway design files.

Census

Census data provide access to population estimates for geographic areas, usually towns and counties. These data can be linked to square mile estimates to uniformly designate, for inter-state comparisons, the population density (population per square mile) of crash locations such as metro, urban, suburban, rural or wilderness.

Vehicle Registration Data

Vehicle registration data provide access to detailed vehicle specifications not normally recorded on the crash report but which may be useful for evaluating the consequences of particular types of crashes. When linked to census and injury data, vehicle registration data can be used to identify, by types of geographic areas (e.g., urban or rural), clusters of specific types of vehicles and expected types of injuries in order to target programs for prevention.

Driver History File

The driver file includes information about the driver's history of convictions and crashes. When driver's crash data are combined with medical cost information, this information is useful to assess the societal costs caused by repeat offenders.

Roadway Design Files

Roadway design files include information about average daily traffic, surface mix, alignment and grade, locations of crashes and type of roadway, which is stored by a photo log, node or other marker.

LINKED CRASH AND INJURY DATA SYSTEMS